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The Journal of the Telephone Industry

JANUARY 19, 1946

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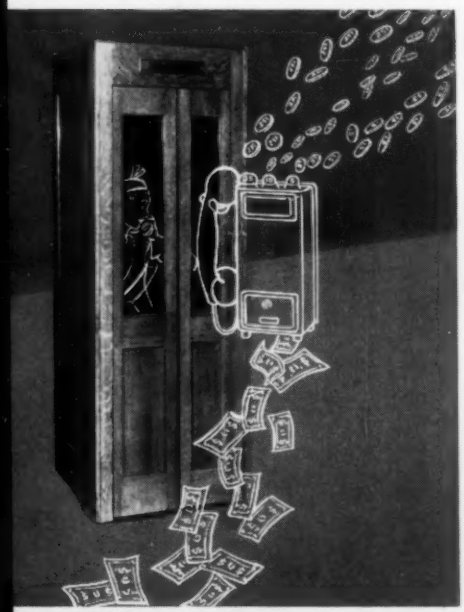

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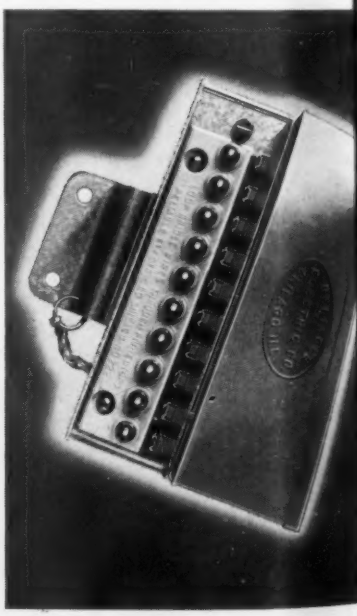

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ABC of the Telephone

By FRANK E. LEE

PART XVI. Theory of Line Protection. The 15th installment of this series appeared in the November 10, 1945 issue, page 13.

BEGINNING with the earliest days of recorded history man has recognized the need for protection from lightning. Before the days of Benjamin Franklin, lightning was thought to be the work of demons and spirits. As such, it was further believed the only means of protection from the effects of lightning was to be found in certain charms or trinkets. Franklin's experiments, as elementary as they were, directed reasoning to a more practical channel.

The first protective apparatus used to guard against lightning discharges was the lightning rod. The theory of an adequate lightning rod system is to provide a lower resistance path to ground than through the building on which the rod is installed.

As knowledge of electricity and its uses increased it became evident that definite measures were needed to protect men and equipment from the dangers to which power transmission systems were subject during electrical storms. The advent of the telephone, with its line wires placed in close proximity to power lines, further emphasized the need for line protection. In the case of the telephone line, the protection equipment, generally, must serve a multiple purpose.

Before an adequate telephone line protection system can be engineered or maintained the source of high voltage hazards must be considered. In general, there are three sources of high voltage hazards to which telephone lines are exposed:

(1) Contacts with power transmission line.
(2) Lightning.
(3) Low frequency induction from power lines.

Of the high voltage hazards, contact between telephone and power lines presents the greatest danger to life and property. The principle reason for the greater danger from power line voltages lies in the continuous nature of the current sent over the power lines. Telephone lines are built to carry low voltage, low amperage currents. Power lines are built for high voltage, high amperage currents. Should a power line come in contact with a telephone line, a fire hazard results from the relatively small telephone wiring being inadequate to carry the power current. In most instances, the insulation of the telephone wire will break down when the wire becomes overheated. If these wires are near combustible material there is a good chance of a fire being started.

Generally, the danger to life is present when a power voltage in excess of 220 volts comes in contact with a telephone line. If a man should come in contact with a circuit carrying 220 volts or more, and the current should flow through his body to ground, a dangerous, if not fatal, shock will result. Often times third degree burns will be found on the shock victim. Generally, the burns will be around those places where the current entered and left the body.

Rules and regulations governing power line construction tend to keep contacts of power and telephone lines at a minimum. Unfortunately, lightning is not subject to such man-made regulations. While the greatest danger to life and property lies in contact between telephone and power lines, the entire outside telephone plant more frequently is exposed to damage by lightning.

Lightning is the discharge created when static electricity in the atmosphere gathers sufficient voltage to break down the insulating effect of the air gap to ground. It has been estimated that the voltage required to cause a lightning flash is approximately 100,000 volts per foot. In view of this assumption, a cloud-to-earth discharge requires a pressure of several billion volts. The current present in a severe lightning discharge has been estimated to be as high as 100,000 amperes.

Lightning may affect a telephone line in one or both of two ways:

(1) A direct hit on some part of the pole line.
(2) Induction into the telephone line.

At the present time, there is no effective method of preventing damage at the point where a direct hit by lightning occurs. The total force at the point of the direct hit is often sufficient to completely shatter a pole, to fuse the wires together or to completely destroy a cable. After a direct hit by lightning there have been cases reported where all the copper in a length of cable has been melted and gathered in solid bunches at intervals along the run. In other cases, the original drop wire insulation was still intact from the pole to the house, but the conductor itself had been completely disintegrated. These cases are mentioned to illustrate the colossal force expended at the point of the direct lightning hit.

The telephone lines themselves will carry away only a small portion of the total current discharge after a direct hit. For this reason, while it generally is impossible to prevent damage at the original point of impact, protective devices connected to the telephone line at subscriber stations, along the line at

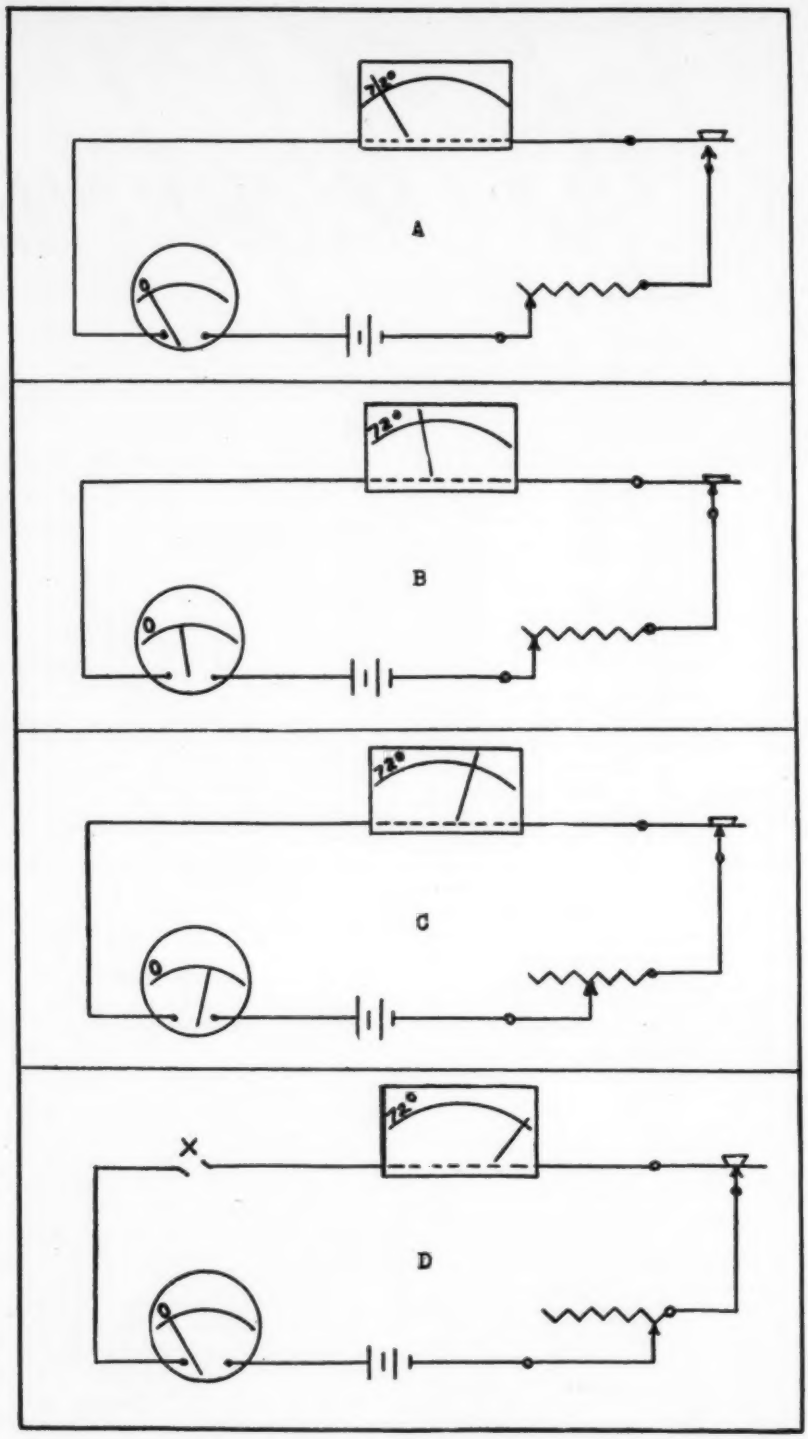

FIG. 1

certain spots and at the central office are effective in preventing damage.

Inasmuch as direct lightning hits are relatively infrequent, taking into consideration the number of lightning discharges occurring in an average electrical storm, most damage to telephone plant is caused by the effects of induced lightning. To explain, while clouds in the upper atmosphere are gathering a high electro-static charge they induce an electrical charge on telephone lines in the immediate vicinity. The induced charge in the telephone line is "bound" to the atmospheric charge until the atmospheric charge is released by a lightning discharge. After the lightning discharge has taken place, the "bound" charge on the telephone line becomes a free charge and will discharge to ground through any available path. If a well-constructed protective device is on the line the discharge will take that path and little damage will result. The severe damage is caused when the free charge bursts through poor insulation on some part of the line and forces its way to ground.

Rounding out the three sources of high voltage hazards is low-frequency induction which is uncommon in comparison with the other two. This type of hazard results where a power line paralleling a telephone line for a considerable distance becomes grounded in a manner to cause current to flow from the line to ground through the fault. Since a high voltage power fault current of this nature would set up a peculiarly strong magnetic field in the immediate vicinity, a current would be induced into the telephone line. The voltage induced into the telephone line would be governed by three variable factors:

(1) Amount of fault current.
(2) Distance the two lines are in parallel.
(3) Degree of inductive coupling between the power and telephone line.

As high as 1,000 volts may be induced into a telephone line by fault conditions from a high voltage power transmission line. Since this induction is due to the fundamental power frequency of approximately 60 cycles it is known as low frequency induction. Voltages of this magnitude could prove fatal to telephone employes who come in contact with the circuit during the time the fault exists on the power line. An additional hazard is the possibility of an operator or subscriber receiving a severe accoustic shock which easily could result in permanent injury to the ear drum.

Protective devices for the low frequency type of high voltage hazard are applied only in event of particularly severe exposures. Where parallels are relatively short and the power line is of limited capacity there generally are no low frequency problems.

Generally speaking, there are three basic elements used in telephone line protection apparatus.

(1) Fuse.
(2) Open space cut-out.
(3) Heat coil.

The fuse and open space cut-out are

used for protection against high voltage hazards, whereas, the heat coil is used to protect central office equipment from damage caused by low value sneak currents. These three elements may be used individually or in combination. Although each element is designed to serve a definite purpose they all may function at about the same time to give protection in the event of particularly severe exposure. In order to better understand these basic elements of telephone circuit protection devices each of the units must be considered separately. (NOTE: The fuse will be covered in this issue and the open space cut-out and the heat coil in the next installment.)

In the telephone field as well as in the power field the fuse long has been the backbone of all protective apparatus. A fuse consists either of a low melting point alloy of lead or of a copper wire of such size that it will melt or break down when carrying a current of a predetermined value. Generally, the fuse element is contained in a fibre, wood, mica or similar case to which are fastened suitable terminals to be used in connecting the fuse into the circuit. Inasmuch as a fuse depends upon heat for its operation, the heating effect of an electric current must be given consideration.

The series circuit shown in *Fig. 1A* consists of a meter, rheostat, push button and battery. A special thermometer, with a grooved section in the base to which is connected the control element, is placed over a section of wire in the circuit. With the circuit open at the push button as shown, the thermometer indicates the room temperature of about 72° F.

In *Fig. 1B*, the push button is closed. Current flow in the circuit produces heat in the wires as indicated by the thermometer.

When the current in the circuit is increased by movement of the rheostat arm the thermometer shows a corresponding increase in the heat of the wires (See *Fig. 1C*).

As the rheostat arm is moved further to the right to lower the total resistance in the circuit the current flow will be increased a corresponding amount (See *Fig. 1D*). At the same time the thermometer indicates heat in the wire has increased. At a certain critical point the amount of current flowing for a definite period of time has increased the heat in the wires to such an extent that one section of the wire has actually melted open at point "X."

From the illustrations in *Fig. 1*, it can be seen that heat generated by flow of current in a circuit depends upon the value of the current. Actually, this heating effect varies as I^2R, where I is the current in amperes and R is the circuit resistance in ohms. In an unfused circuit, as shown in *Fig. 1*, when the critical temperature of the wire is reached, melting or fusing of the wire will take place at its weakest point. It is obvious this point could be at any place in the circuit. Furthermore, the excessive heat would damage the insulation on all of the wire and a serious fire hazard would be at hand.

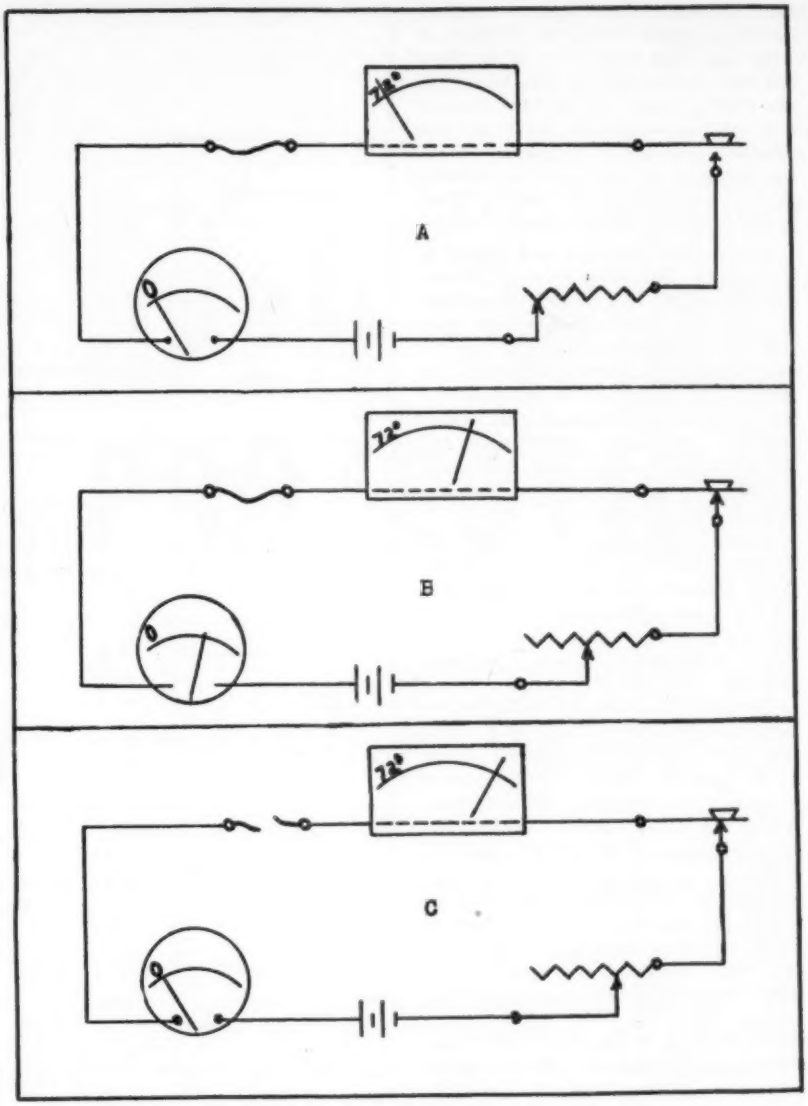

FIG. 2

While all metals are termed as fusible because they can be melted or liquified there are some that will fuse at lower temperatures than others. Combinations of bismuth, lead and tin or of these three metals and cadmium make easily fusible metals or alloys. Webster says "A fuse is a wire, strip or bar of fusible metal inserted for safety in an electric circuit." When the current increases beyond a certain safe amount, the metal melts interrupting the circuit and thereby preventing possibility of damage to the circuit. From this, it can be seen a fuse is an engineered weak point placed in the circuit for protective purposes. Generally speaking, if the correct fuse is in a circuit, the fuse will open the circuit before an excessive current can damage any equipment or wiring.

In *Fig. 2A*, a fuse has been inserted in the test circuit to the left of the thermometer. The fusing point of the fuse element is well below the melting point of the wire used in the circuit. With the circuit open, the thermometer indicates the wire is at or near room temperature.

When the push button has been closed and the rheostat arm moved to permit a current flow near the maxi-

mum for which the circuit is designed the thermometer shows an increase in wire heat (See *Fig. 2B*). While there has been an increase in wire heat, still the melting point of the fuse element has not been reached. Although this illustration shows an exaggerated heating condition it does serve to indicate there is some degree of heating effect in the operation of any electric circuit.

The rheostat arm has been moved to increase the flow of current in the circuit shown in *Fig. 2C*. The melting point of the fuse element has been reached and the circuit is open at the fuse. Thus, the fuse protected the wiring and equipment by opening the circuit before the increased heat caused damage. A fuse, by limiting the amount of heat rise possible in a given circuit, sets a definite limit for the amount of current flow.

Generally fuses used in the outside telephone plant are enclosed in tubular shells through which the element can not be seen. However, in most instances, only two fuses (one for each side of the circuit) are used at a fused protection point in the circuit. If, for any reason, the circuit is opened by the operation of either fuse, both fuses have to be tested to determine the one to be replaced. There is little reason to justify the use of a visible element type or an indicating fuse for the specified locations in the outside plant.

Where a number of fuses are mounted on a separate fuse panel, as would be used in a central office or other switching center, an indicating type fuse would be desirable. It has been found practical in the larger central offices to place most of the fuses on a panel equipped with visual and audible signals to give an alarm when any of the circuits is opened by a blown fuse. The sounding of the alarm calls attention to the fuse panel whenever a fuse operates. In a majority of cases, circuit faults of this nature are caused by installation or maintenance work on the switching equipment. A popular type fuse used for this purpose is called a target fuse. When the fuse is blown a colored target mounted on a spring swings outward from the panel as an indicator. Not only does the raised target readily show which fuse must be replaced, but also the particular color of the target indicates the size of the fuse. For example, if a fuse marked with a red target is blown it should be replaced with a good red fuse. Although most target fuses have their rated capacity stamped on one metal clip, the color of the target is coming into almost universal use as a size guide.

In *Fig. 3A*, it will be noted the circuit from the battery to resistance lamp is completed through a target fuse.

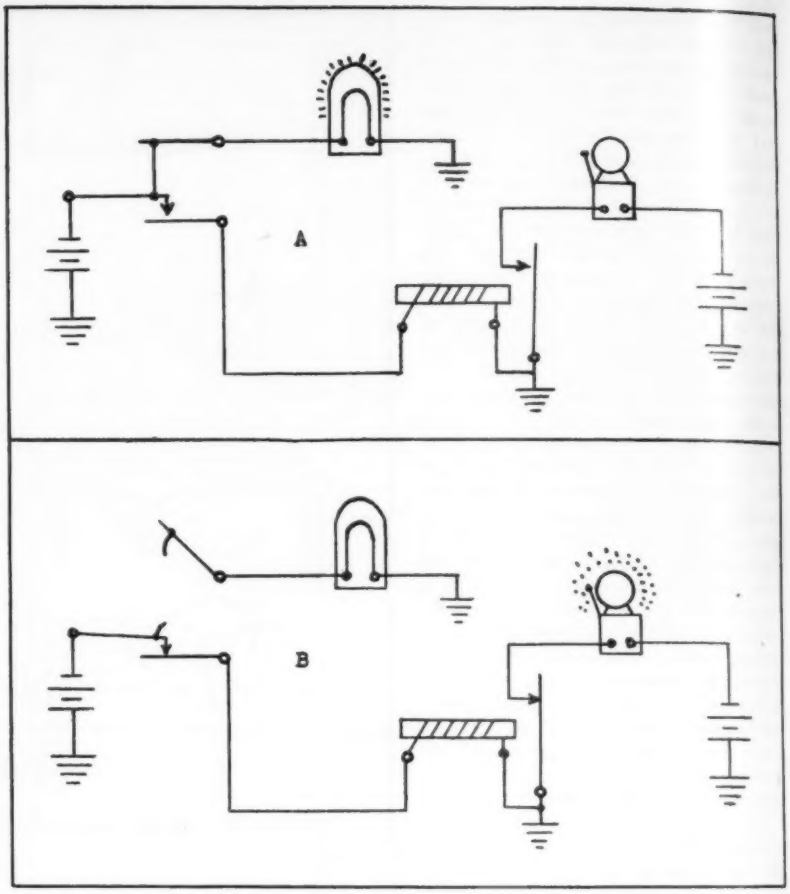

FIG. 3

Too great a current flow in the circuit has operated the target fuse (See *Fig. 3B)*. One section, the target, swings upward to show which fuse has blown, and the lower section, under spring tension, drops down to close the circuit through the alarm relay. When the old fuse is removed the alarm bell is silenced as the alarm relay returns to normal.

Fuses are rated in amperes. A seven-ampere fuse will carry seven amperes of current for an indefinite period. However, if a current in excess of seven amperes is introduced into the circuit it is quite possible that the fuse will "blow." The actual current at which the fuse will blow depends primarily on two factors:

(1) Value of the current.

(2) Length of time the current is applied.

A fuse may carry for a few seconds a current considerably higher than its rated value, but will blow on a much lower current if the current flows for a prolonged period. Generally speaking, a seven-ampere fuse will carry seven amperes continuously and will blow on a current somewhat in excess of this value. In reality, it takes 8.5 amperes to 10.5 amperes flowing for several minutes to blow a typical seven-ampere fuse. For currents over seven amperes but under 20 amperes from one to several seconds ordinarily is required to blow a seven-ampere fuse.

The most widely used fuse in the outside telephone plant is the seven-ampere fuse. This size fuse was selected because its value is low enough to prevent damage to the equipment it is protecting, yet it is sufficiently high that the fuse will not operate should a series street light circuit become crossed with the telephone line. Series street light circuits normally use a six-ampere current. In the event of a cross between the series street light circuit and the telephone line it is desirable that a path to ground be provided for the power current. (Such a path is provided by open space cutouts which will be discussed under that

(Please turn to page 45)

TOPS *in*

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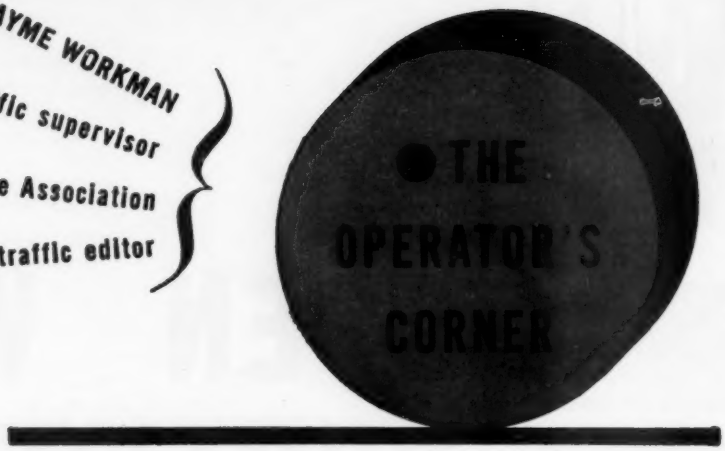

PROMISCUOUS transferring and holding up calls places undue responsibility upon switchboard operators and frequently results in service criticisms, due to failure on the part of the subscriber making the request to notify the traffic department when the transfer of calls is to be discontinued.

Chief operators and supervisors should be familiar with conditions warranting a transfer of incoming calls and should adhere to the established practice.

The most common conditions resulting in a subscriber's request that incoming calls be held up or temporarily transferred to another line are sickness, temporary absence from home or death in the family.

Requests to transfer or hold up calls in connection with working stations should be granted only in cases of extreme importance or emergencies.

The following requests generally are granted:

(A) Where a human life is involved.
(B) For large business corporations, hospitals, police or fire lines, etc.
(C) Where lines involved temporarily are out of order and an interruption to incoming service would work a hardship on the customer or public.
(D) Expected incoming toll board calls in manual offices.
(E) In cases of death, serious illness or when a refusal would work a hardship on the customer. During the war, requests from government agencies, such as the Army, Navy, and FBI in general were granted.

The following requests generally should be declined:

(A) Requests for any arrangement which constitutes secretarial service by telephone company employes.
(B) Expected incoming local or "a" board toll calls.

In small offices, it is not uncommon to receive a request to transfer calls because a subscriber is going to a neighbor's to play bridge, or some similar circumstance. Business subscribers also frequently make requests to transfer calls which, if granted, constitute "rendering secretarial service by telephone company employes."

If a subscriber asks to have his calls transferred or held up until after a funeral, this request should be granted.

The following are typical requests to transfer expected incoming local or "a" board toll calls:

(A) Very serious illness. Wants calls transferred or held up until party is somewhat better. If, however, the person making the request states that the ringing of the bell might cause a serious disturbance to the party who is ill, the request to transfer or hold up the calls should be granted.

(B) If a doctor wants an expected call from a patient transferred because he will be out for the evening or at a hospital, the request should not be granted unless some additional facts are developed which may warrant the granting of the request; for example, the patient is very seriously ill, has no telephone and has been instructed to have someone report to the doctor over the nearest available telephone.

(C) If a subscriber requests his calls for his place of business be transferred to his residence on account of business being dull, such a request should be declined.

(D) A request to transfer calls should be declined if the subscriber making the request gives as a reason, going to the theater, out for the evening, etc.

Whenever a request to transfer or hold up calls is granted, the subscriber should be told he is responsible for arranging with the subscriber to whose telephone the calls are to be routed, for acceptance of such calls.

In a manual office, if the chief operator receives a request to transfer or hold up calls for a period of less than 24 hours, she may grant the request. Requests for a period of more than 24 hours should be referred to the manager. In a dial office, all requests to transfer or hold up calls should be referred to the manager, regardless of the length of time or reason for which the transfer is desired.

When a subscriber's line is out of order and important toll calls are expected, the wire chief may authorize the chief operator to transfer calls temporarily.

The foregoing is in answer to question No. 1: "May subscribers have both their local and long distance calls transferred to another number?

Questions from Illinois Operators

(1) May subscribers have both their local and long distance calls transferred to another number?

(2) When incoming long distance calls are being transferred to another number, should the operator explain to the incoming toll operator or ring the number to which calls are to be transferred?

(3) If a second alternate route is provided, where should it be entered on the ticket?

(4) What is the advantage of rotating operators' tricks?

(5) Why is it that the toll center can never locate her ticket on a WH report?

Answers to these traffic questions are presented on page 40.

V V

>> *It is a general error to suppose the loudest complainers for the public to be the most anxious for the welfare.*—**Burke.**

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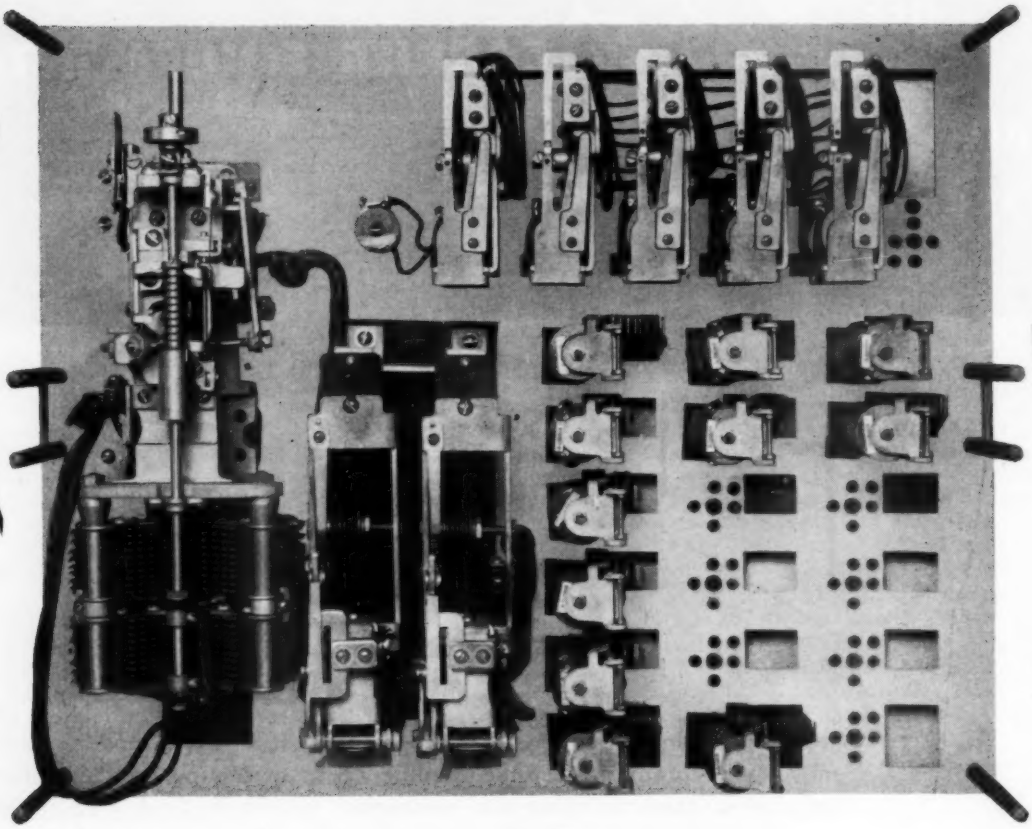

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1. The "Director" provides all facilities for translating dial impulses into any number and combination of digits needed to route the call to the desired distant office.

2. The "Director" permits the use of a simple universal numbering plan regardless of the number of tandem switching points involved.

3. The "Director" permits the concentration of traffic over common trunk groups, thus taking advantage of maximum plant economies.

4. The "Director" automatically provides for routing calls over available alternate trunk routes whenever an all-trunks-busy condition is encountered.

5. The "Director" may be employed in those offices of a network where the trunking conditions require its use, and may be omitted from the offices where it is not needed. It may also be added at any later time should changing conditions make its use desirable.

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BY FRANCIS X. WELCH

TELEPHONY'S Washington Editor

FCC starts hearings on use of telephone voice recorders. . . . Bell and Independent men contend strongly for restriction on use of recorder instruments. . . . Bell has considered three types of protection of doubtful value. . . . Approximately 15,000 recording devices in use in the country.

COMMISSIONER Paul A. Walker of the Federal Communications Commission presided over the hearings at the FCC headquarters in Washington, D. C., beginning January 10 on the use of recorder devices in connection with telephone conversations. The FCC inquiry was limited to the effect of such use or abuse on interstate and foreign telephone communications. The way this problem is being studied and worked out by the FCC in these proceedings, however, is bound to set a pattern if not a precedent for parallel action later on by the state commissions with respect to interstate telephone traffic.

Principal witnesses for the operating telephone industry at the outset of the hearings were W. C. Henry, president of the United States Independent Telephone Association on behalf of the Independents, and Keith S. McHugh, vice president of the American Telephone & Telegraph Co., on behalf of the Bell System. Both telephone men contended strongly for some form of restriction on the use of recorder instruments, except under special circumstances, which would assure positive notice to all parties to the telephone conversation that the same was being recorded.

Mr. McHugh testified that if any sizable number of people want what they say over the telephone recorded, the telephone company hasn't heard about it. He ventured his opinion that the last thing the average person wants is a permanent record made of what he says over the telephone—especially without his knowledge or consent.

This line of testimony clashed somewhat with the view expressed later on in the hearings by Ray Blain, called as expert witness by The Soundscriber Corp. (manufacturers of recorder devices), to the effect that the average honest man is not ashamed of what he says over the telephone and does not really fear any record being made of the same. The recording device manufacturers' testimony generally took the line that recorders have won popular approval as a useful device and will be used under certain circumstances, regardless of artificial attempt to limit or prevent their use or put them on a bootleg basis. Therefore, the manufacturers generally contended that no restriction, which the FCC may see fit to impose on the use of recorders, is necessary, nor will it serve any useful purpose, and might well be of doubtful validity under the law.

Going back to the telephone industry's testimony, Mr. McHugh claimed that if recording machines should become commonplace, many users would become telephone shy, because of "shaken confidence in the privacy of calls." He added that the operating industry "has no objection to recorders on private telephone lines not connected to the general exchange telephone system."

Testimony of both Mr. Henry and Mr. McHugh emphasized the fact that the telephone industry has constantly sought, throughout the years, to impress upon telephone conversation the character of a confidential communication comparable as near as possible with face-to-face conversation. It was pointed out that if the average citizen, engaged in face-to-face conversation were suddenly appraised of the fact that his remarks were being recorded surreptitiously, without his knowledge or consent, he naturally would be outraged. Why should not the telephone-using public be expected to react similarly to any widespread use of recording devices in connection with telephone conversation?

The AT&T official said that three different forms of protection had been considered in connection with proper or legitimate use of telephone conversation recorders. At least two of these, he admitted, were of doubtful value. First there was the idea of a special directory listing, placing a star or asterisk beside the party's name in the telephone book where a telephone known to be using a recording device

was listed. An obvious objection to this proposal would be that it affords no protection whatever to the party who might be called from a telephone station so listed. It would only afford "one-way" protection.

The two-toned chime or warning signal was the second proposal suggested in connection with the use of the recording device, so that the parties at either end of a telephone conversation would know that a recording device was being used. This raised the question of the practical difficulty of enforcing regulations for the *exclusive* use of devices which incorporate such a warning tone feature. Aside from that, Mr. McHugh observed that only a small percentage of the people using telephones would ever be exposed to to the use of the recording device, and so would not be familiar enough with the tone to recognize its significance.

The third protective measure commented upon by Mr. McHugh was the "operator announcement" arrangement. The use of a recording device, under this setup, would be authorized only in connection with special telephone lines routed through a special board in the telephone company's central office. Periodically an operator announcement would break into the conversation over these lines with the statement, "This conversation may be recorded," or other words to that effect.

The difficulty with this form of protection right now is the fact that it would take a considerable amount of special equipment and central office capacity just at a time when the operating telephone industry is straining every effort to catch up with the large backlog of demand for normal telephone service accumulated during the war. Mr. McHugh said that the Bell System would cooperate, to the best of its ability, in any attempt to work out this or any other protective measure to avoid the abuse of recording devices if the FCC should determine upon such course of action.

The witness for the United States Independent Telephone Association, Mr. Henry, who is also general manager of the Northern Ohio Telephone Co., Bellevue, Ohio, largely followed the line taken by Mr. McHugh. He departed somewhat, however, when he emphasized the inability of the smaller Independents to devote their available supply of labor and materials at this particular time to any program involving costly and extensive protective arrangements against the abuse of recorders. He added that the Independents feel, just as much as the Bell companies, that unauthorized use of recording instruments which would shake the public confidence in the traditional secrecy of telephone conversation is a challenge to the industry and the public interest.

Elliott Lovett, attorney for the Soundscriber Corp., told the FCC that "telephone recorders have gained wide public acceptance as an important adjunct to efficient business and government administration." Mr. Lovett said:

"A warning notice to the outside party is unnecessary because of the public acceptance of electronic or mechanical recording and of secretarial monitoring of telephone conversations. If any notice should be held desirable, a notation in connection with the subscriber's listing in the industry would suffice."

An especially interesting development, on the other side of the picture, was the disclosure of the attitude of the U. S. Navy Department. The Navy revealed that during the war it had installed over 1,600 recording devices for use with telephone conversations in various naval shore installations throughout the country. These devices, it was said, have proven of considerable value, first as a means of preserving "confirmation records," eliminating confusion and misunderstanding; and, secondly, as a means of preserving more permanent records.

The Navy rejected the idea that secrecy of ordinary telephone usage would be materially affected any more —through the use of recording devices —than heretofore. It was pointed out that businessmen and others have long made use of silent stenographers taking down notes, through extensions cut in on telephone conversations, so as to make a record thereof. Sometimes this has been done with the knowledge and consent of both parties to the conversation, and sometimes otherwise. It was argued, however, that the use of a business machine to fulfill the same function (previously performed by a living stenographer) was not of itself an invasion of the privacy which the great mass of telephone-using public can reasonably expect.

The Navy also disapproved of the contention that the use of the modern style recorder constitutes a violation of the old regulation of telephone companies against the use of so-called "foreign attachments" to telephone instruments or facilities, but by use of induction coils or employing acoustical art, recordings can be made of telephone conversations without physical contact. It was said that the "foreign attachment" regulation has, therefore, become outmoded, in its application to recording devices.

Some surprise was occasioned by the large number of telephone recording devices believed to be already in operation. One manufacturing concern indicated that 5,000 of such instruments of its own make are in operation. Another manufacturer indicated that perhaps a similar amount of units of its product are being so employed. If these were to be added to the number admitted to be used by the Navy, plus an indefinite number of other devices so employed, some of which were not originally designed for use with telephone conversations, a very rough estimate of perhaps as many as 15,000 recording devices now in use throughout the country is suggested.

The cost factor, on the other hand, suggests that the modern efficient telephone recorder device is not very likely to become the household plaything of the masses in the near future. Superior types of equipment, especially designed for use with telephone conversations, were said to range between $200 and $300 and higher per unit. (Incidentally, one recording company witness got quite a laugh when he revealed that an advertisement clipping describing this type of equipment had been taken from the classified advertising section of a Southern Bell Telephone Co. directory.)

Nobody is spending that kind of money for a toy for the kids to play with or for gags and horseplay among friends or neighbors. The whole trouble with this recorder problem, however, is that the abuse is just as likely to arise (if not more so) from authorized use of cheaper home-made or converted recording equipment as from parties who are ready, willing and able to pay for specially designed equipment.

Almost any one of the ordinary radio-phonograph combinations now operating in so many American homes can be converted into a "home-recording instrument" by the application of simple, relatively inexpensive attachments designed to let people make records of their own voices or musical efforts within their own homes. From this stage, almost any bright high school sophomore, with any natural aptitude for electronics or radio, ought to be able to rig up a mike attachment to clip on the bell box, and so forth.

Here is the real danger of widespread abuse of unauthorized recorders —if they ever struck the public fancy on a wide scale. What's more, there seems little which the FCC, or the telephone companies, or the recording manufacturers could do about it from a strictly legal standpoint to enforce practical restrictions. What *can* be done in that direction, of course, *should* be done. And that is what the

(Please turn to page 48)

Nationwide Operator Toll Dialing

FOREWORD

The following is the second of five articles. The first article, referred to in the following as the "August 13 memorandum," furnished a general description of the plan. (TELEPHONY, January 12, page 13.) This and subsequent articles discuss the operational features of nationwide operator toll dialing. In particular, the current article provides a brief statement defining the scope of this and subsequent articles in their relationship to the "General Description" and also discusses the proposed minimum features when an office is to be arranged for toll line dialing and other features that are desirable but not essential.

Throughout this and subsequent articles the proposed minimum features are identified by phrases such as "should provide," "should be provided" and "should be arranged" while the desirable features are designated by phrases such as "it is desirable" and "may be arranged."

The current article also discusses toll centers and tributary offices.

This information is made available to the industry by the American Telephone & Telegraph Co., through the Dial Interexchange Committee of the United States Independent Telephone Association.

F. E. NORRIS, Chairman
USITA Dial Interexchange Committee

* * *

I. GENERAL

A SEPARATE memorandum dated August 13, 1945 (TELEPHONY, January 12, page 13), gave a general description of the nationwide operator toll dialing plan with particular attention to Independent company aspects. That memorandum described numbering plan arrangements in some detail, emphasizing the importance of including all offices in the country in national numbering plans whether they are manual or dial in order to provide operators with a code for calls to those offices. The August 13 memorandum also discussed the need for common control systems in perhaps 150 of the major switching points in the country, pointing out that the rest of about 2,400 toll centers could have toll dialing equipment without senders, such as the present step-by-step toll dialing equipment or a simplified form of crossbar equipment. To avoid duplication, these and other items discussed in the August 13 memorandum are not repeated in the present memorandum, though they need to be considered in connection with future engineering of any toll center or tributary office.

The term *toll line dialing* as used in this memorandum describes a method of operation which enables an outward toll operator to complete calls on a fully automatic basis to dial subscribers in a distant city or area. Calls to subscribers in manual offices may also be completed through dial switches at intermediate points. The operator has control of the entire connection, both its completion and release and receives switchhook supervision from the called as well as the calling station.

Although sender systems will be required at control switching points in the nationwide network, it is expected that many calls will be completed on a dial basis without requiring use of a sender system. Direct circuit calls which do not involve a control switching point at either originating or incoming end will be handled by the operator dialing the local called number over the direct trunk. To the extent found desirable, this form of operation, i.e., not routing through control switching points, can be extended to switched traffic to nearby places. A separate system of codes for the selection of the toll route will be used for this purpose. Since a large part of traffic on which both Independent and Bell System companies are jointly involved may be of this kind, the description of operating practices in the present memorandum relates chiefly to methods and arrangements for handling such traffic which may often employ step-by-step equipment. The August 13 memorandum covers in some detail the handling of traffic employing sender systems and if the arrangements described herein are provided the offices so equipped will operate with sender systems without further modification.

II. TOLL LINE DIALING

A. Toll Centers

2.01 Outward Toll Switchboard

2.011 Operating Procedure

At an originating toll center provided with the minimum features discussed in this memorandum, the operating procedure will be as described below.

As soon as the operator has recorded the details of the call she may plug into an idle dial line to the terminating toll center, if she has a direct circuit to that point, and dial the called number as listed. On calls that are switched at an intermediate toll point, she may precede the listed subscriber number with digits of a code provided for the purpose. The operator's cord supervisory lamp remains lighted until the called subscriber answers at which time it will go out. While the called subscriber is being rung, the audible ringing signal is received by the outward toll operator. When the called subscriber hangs up, the outward operator's cord supervisory lamp will light again to indicate the end of the call. If an all trunks or line busy condition is encountered, the cord supervisory lamp will flash at 120 or 60 IPM respectively.

If the call is intercepted, the outward operator's cord supervisory lamp remains lighted in order to avoid false charging.

The toll line dialing system makes use of "start dialing signals." These signals indicate to the operator when she may start or should stop dialing. For instance, when the equipment at the distant end of the toll line is ready to receive pulses, the start dialing lamp lights and the operator dials while the lamp is lighted. When connection is made to equipment which is not ready to receive the pulses, the start dialing lamp will go out and the operator should stop dialing until it lights again. Where outgoing senders are used, the sender starts and stops pulsing in accordance with the start dialing signals.

If the call is for a subscriber at a community dial office which is tributary to the terminating toll center, it will be necessary for the outward operator to determine by reference to a bulletin, the arbitrary code digits which must be dialed ahead of the listed number. This arbitrary code begins

with "1." If the call is for a subscriber at a ringdown tributary point the operator also will determine from her bulletin the arbitrary code which must be dialed to reach the tributary operator. This code also begins with "1." As soon as connection has been made to the ringdown tributary group, the outward operator's cord supervisory lamp will be retired.

If the call requires assistance from an operator at a distant toll center such as the inward, outward delayed, or information operator, the outward operator dials the arbitrary codes 121, 11X and 131, respectively. The X in the 11X code for the outward delayed operator is a number provided by the outward delayed operator to identify her position to the called subscriber. On calls to inward and outward delayed operators, arrangements to permit re-ring signals in both directions are provided so that the operators may be recalled to the connection without setting up the call over again. On calls to subscribers and information operators re-ring signals are not used.

2.012 Equipment Arrangements. The outward toll switchboard should be arranged either for dialing or key pulsing. It should also be provided with means for receiving supervisory signals from the dial toll line. These signals include the "start dialing" signal referred to below, as well as switchhook signals and the same facilities will receive them as receive the switchhook signals. Switchboards such as the Bell System No. 3 toll and No. 11 switchboards (or Independent company boards of the sleeve supervision type) require very little modification to provide this feature. Switchboards of the No. 1 toll variety with the supervision on the tip and ring require a major modification to provide the necessary dialing and supervisory arrangements and the start dialing feature can be readily installed at that time. Cordless and key pulsing type switchboards require outgoing senders to send the dial pulses so, instead of the start dialing feature requiring a modification in the switchboard, changes may be necessary in these outgoing senders to recognize the start dialing signals.

In the smaller switchboards it may be satisfactory to arrange the positions for dial cord dialing. In this case, the toll line jack multiple will be provided with additional jacks used only for dialing. The supervisory signals may be received on a lamp in the multiple basis or on the supervisory signal associated with the regular cord circuit. The lamp in the multiple is associated directly with the dial toll line jack into which the operator plugs and this avoids the necessity of arranging the cords of the switchboard to receive the supervisory signals.

Detailed conversion procedures are available for Bell System switchboards and it is assumed that similar procedures readily can be provided for switchboards of Independent manufacture.

The dial toll lines appearing in the outward toll switchboard, in addition to applying the proper per cent, break dial pulses, also should provide, under control of the outward operator, means for sending re-ring signals over the toll line signaling channel. The re-ring signal is one dial pulse. Reference to Division IV will show the characteristics of the dial and re-ring pulses.

2.02 Incoming Switching Equipment. Toll line dialing calls incoming to the toll center make use of dial switching arrangements which should provide access from dial toll line to local numbers, tributary offices, operators at the toll center and at through switching offices to either dial or ringdown toll lines to other toll centers.

The arrangements of the switches should be such as to permit connection to local numbers without the use of prefixed digits. It also should permit the assignment of standard codes for reaching inward, outward delayed and information operators. The uniform codes proposed for this purpose are:

Inward operator—121
Outward delayed operator—11 followed by the leave-word number of the delayed call operator
Information operator—131

At through switching toll centers it is desirable to make provision for reaching delayed through or call-order operators. The code for this purpose should be 151. At some toll centers it is desirable to make provision for getting access to the toll testboard or the one-milliwatt 1,000 cycle source for testing purposes. The codes 101 and 102 should be used here.

2.03 Other Features Provided at Incoming Toll Center. In addition to the switching mechanism to provide access to the completing trunks and toll lines at the incoming toll center there are, of course, the various types of trunks to local offices, tributaries and operators at the toll center. The general features which should be provided by the trunks and their associated equipment are:

2.031 Busy Signals. The equipment in the toll and local offices at the toll center should provide visual flashing busy signals. The line busy signal should be a 60 IPM flashing supervisory signal superimposed on the usual 60 IPM tone. The all trunks busy signal should be a 120 IPM flashing supervisory signal without tone. These 120 IPM visual flashing signals should be provided by the selectors used to reach toll lines or toll completing trunks.

A desirable feature for toll centers

COMING CONVENTIONS

Minnesota Telephone Association, St. Paul Hotel, St. Paul, January 28, 29 and 30, 1946.

Texas Telephone Association, Adolphus Hotel, Dallas, Texas, March 11 and 12, 1946.

Kentucky Independent Telephone Association, April 4 and 5, 1946. No hotel named as yet.

Nebraska Telephone Association, Paxton Hotel, Omaha, April 9 and 10, 1946.

Iowa Independent Telephone Association, Ft. Des Moines Hotel, Des Moines, April 11 and 12, 1946.

United States Independent Telephone Association Executives' Conference, Edgewater Beach Hotel, Chicago, April 16 and 17, 1946.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 23 and 24, 1946.

Indiana Telephone Association, Severin Hotel, Indianapolis, May 1 and 2, 1946.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, May 8 and 9, 1946.

Wisconsin Independent Telephone Association, Park Hotel, Madison, May 14, 15 and 16, 1946.

New York State Telephone Association, Hotel Onondaga, Syracuse, May 22 and 23, 1946.

Pennsylvania Independent Telephone Association, Lawrence Hotel, Erie, June 4, 5 and 6, 1946.

Michigan Independent Telephone Association, September 18 and 19, 1946 (tentative). No hotel named as yet.

United States Independent Telephone Association, Stevens Hotel, Chicago, October 14, 15 and 16, 1946.

where switching is done between toll lines, is an additional flashing signal (30 IPM) to indicate that all toll lines are busy and a change in the rate of flash (120 IPM) to indicate when a toll line has become available.

2.032 Start Dialing Signals. Start dialing signals should be used to start and stop the pulsing from senders or to inform operators to start or stop dialing. These signals are required for toll line dialing whenever the toll line or trunk terminates in equipment which may not be ready to receive pulses immediately. The two cases where this applies are: Toll offices making use of senders, and community dial offices in which the incoming trunks terminate on line circuits.

The toll office switches used with trunks which send back start dialing signals should be arranged so that during the trunk hunting interval and for a brief time thereafter, a stop dialing signal will be sent back over the toll line. This signal should be continued without interruption under control of the trunk. The outward operator should not dial nor should the outgoing sender pulse the succeeding digits until the equipment at the distant office is ready to receive them. The toll line or trunk in this case should be in the on-hook condition when idle, but should change to the off-hook or stop dialing condition as soon as it is seized. The time required for this shift from on-hook to off-hook should be covered by the toll office switch stop dialing indication mentioned earlier. The seizure signal should cause the equipment to prepare for the reception of pulses and when this has been done, the stop dialing condition should change to the start dialing or on-hook condition.

The toll line dialing system should be designed so that it is not necessary on the usual call to stop dialing between digits since in most offices the equipment is ready to receive pulses when the trunk to that office is seized. Provision should be made, however, so that one start dialing signal can be received in the sender between digits. A start dialing signal should include both the stop and the start dialing condition. This means, however, that any incoming senders which may be used to switch calls should be arranged to receive all the remaining digits once it is attached to the toll line or trunk.

2.033 Dial Tone. On trunks terminating on line circuit equipment at community dial offices, dial tone should usually be furnished by links or switches when the equipment is ready to receive pulses. Because of this, even though the equipment provides start dialing signals, dial tone should ordinarily be superimposed on the start dialing or on-hook condition. Inasmuch as some forms of voice frequency signaling will not function in the presence of dial tone, extra equipment may be required in certain cases at the toll center end of the trunk to prevent the dial tone from being passed back to the toll line equipment.

2.034 Audible Ringing Signal. The usual audible ringing signal should be provided on subscribers' lines while the called station is being rung. This signal is not required from trunks used to reach operators in the toll office.

2.035 Common Battery Supervision. Common battery supervision should be provided at all local stations and is highly desirable on all stations, including toll stations wherever possible, rather than magneto operation. Only in this way can the maximum benefits of toll line dialing be obtained.

2.036 Start of Ringing. At the toll center, it is desirable that the automatic start of ringing type of toll completing train should be used for completing inward toll calls. When this type of train is not provided, a line seizure signal usually should be sent back from the local to the toll office, by the toll completing train, when the subscriber's line is reached. In this case, the line seizure signal should be used to start the machine ringing automatically on toll line dialing calls. The manual start of ringing type of toll completing train should be used for outward delayed toll calls.

2.037 Release of Connection. The release of the connection should be under the control of the outward operator. There may be cases, however, where joint control (release under control of both the operator and the called subscriber) trunks are used between the toll and local or community dial offices to complete toll line dialing calls. If so, it is desirable that the trunks at the toll office end be arranged so that the holding condition for the toll office switches will be removed long enough to permit these switches to release on disconnect of the distant outward operator even though the called subscriber's receiver is still off the hook. Under this situation the busy condition should be reapplied to the completing trunk to prevent reselection by the toll office switches until the called subscriber has placed the receiver on the hook.

2.038 Intercepting. Where toll line dialing is used, the intercepting equipment should be arranged so that answering supervision is not given. In other words, an off-hook signal should not occur when the intercepting operator answers. This is to avoid false timing and charging by the outward operator on this type of call. In this case, the intercepting facilities may also be arranged so that the intercepting operator can identify toll calls. When a tone is used for this purpose the intercepting operator should be able to remove it without retiring supervision to the toll operator. A key should also be provided so that the intercepting operator may flash the supervisory lamp of the calling operator. These flashes should be sent under control of a timed relay which limits the off-hook interval of the flash in order to avoid charging. This interval normally should be of the order of .3 to .5 seconds.

Toll centers usually are provided with local intercept service. Where this is not the case, outward operators dialing into such an office, need to be warned by a bulletin notice that intercept service is not provided and therefore any "Don't Answer" conditions should be verified before being given to the calling customer.

2.039 Re-ringing on Trunks to Operators. The toll lines and trunks to operators should be arranged to permit ringing in both directions on toll line dialing calls. The need for this is brought out by the following example: In order to complete a leave-word call it sometimes is necessary for the outward delayed operator to recall the originating operator or vice versa. In this case, it is desirable that the operators can recall each other by ringing to avoid setting up the connection again when it is necessary to recall.

B. Tributaries

Dial tributaries or community dial offices in many cases will be reached by toll line dialing facilities so that the distant outward operator may complete to the tributary subscriber on a fully automatic basis.

If the dial tributary also has a switchboard it will be desirable that it have the features discussed under Toll Centers to the extent needed to handle outward toll traffic.

2.04 Incoming Switching Equipment. There are advantages in having incoming tributary trunks terminate on switches rather than on subscriber line circuits. The relative merits of the two methods of termination are discussed in some detail in Division IV.

2.05 Other Features Provided at Tributaries.

2.051 Dial Tone. When the trunk terminates on subscriber line equipment, dial tone should be applied, in the usual case, when the equipment is ready to receive dial pulses. As covered in section 2.033 under Toll Centers extra equipment is required in some cases at the toll center to prevent this tone from interfering with the setting up of the call.

(Please turn to page 46)

THE PLANT MAN'S NOTEBOOK

BY RAY BLAIN • TECHNICAL EDITOR

BACK in the early days of telephony, whenever it was decided that a "grunt" should be made a lineman, we just gave him a pair of hooks and told him to start climbing. If he fell, we only laughed, and if he got hurt, we were sorry. Very little consideration was ever given to safety practices in those days. Neither was the length or cost of the training period for new linemen given much thought.

Things certainly have changed for the better since those days. New men now are carefully instructed in the proper use of tools and training courses are conducted in the strict observance of necessary safety practices before they are allowed to attempt to climb a pole. Due to an observance of certain proved rules, these men learn to be linemen in a much shorter period than formerly. This, in addition to the fact that they develop into better qualified workers than if left to figure out new problems for themselves, certainly proves the value of proper training methods within our industry.

* * *

Getting what you go after is called success; but liking it, while you are getting it, is happiness.

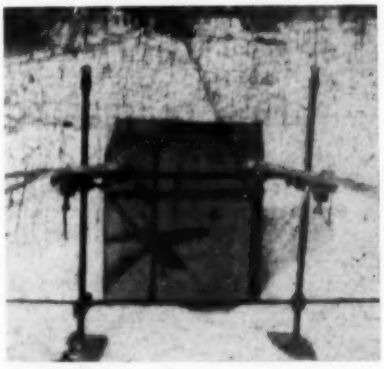
* * *

The writer had the pleasure recently of spending a day at one of the Army's personnel discharge centers, located at Fort Dix, N. J., where about 4,000 GI's are released daily from the service. If you do not consider it quite a task to discharge this number of men in such a short period of time, we suggest that you visit one of these centers and then decide for yourself. This mammoth undertaking is, however, made considerably easier by the extensive use of all types of wire communication. The telephone, intercommunication loudspeaker sets and public address systems all are used in each of the buildings of this discharge center.

* * *

We are in receipt of a letter from L. W. Turner of Brookings, S. D., who has been a cable splicer for 40 years. He states that about a year ago he became tired of looking for bricks and other loose objects to set up a cable for splicing in a trench, so he designed an adjustable rack and obtained a patent on same.

This rack consists essentially of two uprights, and a cross brace near the bottom. Two brackets hold the cable



being spliced firmly in place. Adjustments, both horizontal and vertical, are provided by wing nuts. When the cable is set up on this rack, it is held firmly and there is not the slightest danger of causing damage to a newly made joint due to accidental movement before it cools properly.

* * *

Cutting open trenches through streets and roads is becoming more difficult and expensive due to increased automobile traffic. To avoid this expensive and difficult practice, the use of the horizontal earth drill surely will increase in the future. These drills are sectional and are powered by a small gasoline engine. The total outfit weighs only 750 lbs. A hole 4½ ins. in diameter can be drilled accurately under streets and roads. Cable either can be placed directly in this bored hole or sectional conduit can be pulled in place and the cable pulled in the conduit later.

* * *

One of our readers states that he does not understand the theory of the retardation coil as used in a common battery cord circuit. In the design of any cord circuit, consideration is given first to the supply of direct current to the calling and called stations. This is necessary in order that sound waves, striking the transmitter diaphragm of either telephone, will cause the direct currrent to be varied and thereby set up voice currents. It also is necessary to establish a path for voice currents through the cord circuit. This must be accomplished without materially affecting the quality of transmission between stations or creating a condition which causes crosstalk between the various cord circuits on the switchboard.

In order to prevent voice current from passing through the battery, some device must be placed in series with the battery which will permit the direct current to pass through it and be fed to the stations, yet will block out voice currents and force them to continue to the other telephone. A low resistance retardation coil can be used for this purpose.

The properties of these retardation coils are such that they offer high impedance to voice frequencies from 200

to 2,700 cycles, and low resistance to direct current.

* * *

Someone has stated that driving an automobile is a full-time job requiring continuous concentration. Lack of driving attention contributes to—if not actually is responsible for—the majority of automobile accidents.

* * *

A reader has requested information concerning the transmission equivalent of No. 12 NBS copper circuits per mile. With 12 in. spacing between conductors, the side circuit dry weather equivalent at 1,000 cycles is 0.105 DB per mile.

* * *

A reader, who has asked that his name be withheld, has the following comment to make on cable breathing:

"This refers to the article on 'Cable Breathing' in Vol. 129, No. 20, page 19, issue dated November 17, 1945, expounding a theory and stating (not suggesting) a method of prevention which costs real money, pertaining to a subject which might be of interest to a laboratory employe or a manufacturer, but should not be allowed to bother a practical telephone man.

"Yes, cables do breathe! But oh, so gently! I have seen a manometer connected to an aerial cable of several miles in length, at high noon, when a hot sun had been shining for several hours, and it showed a half-pound pressure caused by air expansion; and that same day a few hours later, after it had cooled off, the mercury was sucked into the tube showing less than atmospheric pressure. It rained plenty that afternoon, proving that during the sucking-in period the surrounding air was 100 per cent humidity, but the cable insulation was O.K. and there was plenty of several types of terminals connected to that cable and there was certainly an underground section to which the cable was connected.

"That was several years ago and the cable still is giving good service. How can this be true with that cable breathing constantly on some days several times reversing the direction of pressure?

"Why is it that all of this telephone plant, most of which has existed for years, has given such good service and is continuing to do so today and will do it tomorrow, and the next day, etc., if this individual's theory is correct?

"You can't beat facts, Mr. Editor, and an engineer's profession requires that he secure all of the facts available on a subject before he forms a conclusion.

"Methinks a theoretical, not a qualified, engineer has spoken.

"Why scare the pants off of some good telephone people who have so many troubles these days without someone pulling a New Deal trick on them? . . .

"May I say in return to any who may have been perturbed by this article—

"Install your cables carefully.

"Check and test to prove their installed condition.

"Inspect them periodically.

"Maintain them by keeping out cracks, nicks and other damage and they will serve you well."

If there are other readers who have additional information — either pro or con — on this interesting controversy, we should appreciate hearing from them.

It is the opinion of the writer that climatic conditions undoubtedly contribute to troubles of this nature in certain localities.

* * *

"Jake," the lineman, says, "Do not bridge more than two pairs of wires on one pair of binding posts in a cable terminal if trouble is to be avoided. When more than two pairs of wires must be bridged to one cable pair, the additional wires should be connected at some point outside the terminal."

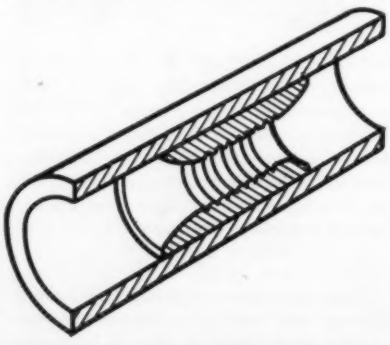
* * *

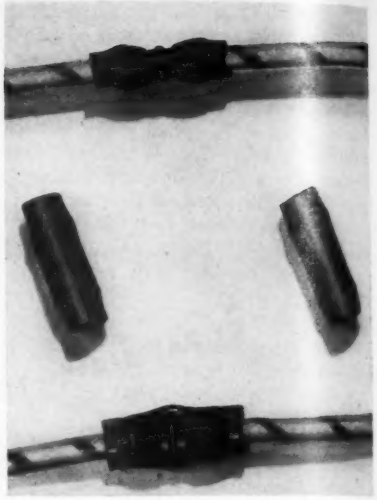
Telephone men always have disliked the tedious splicing of small wire, such as house wire and main frame jumper wire. Some telephone companies do not permit the splicing of main frame jumper wire for when the old-fashioned methods are used these splices are unsightly and usually cause trouble.

By old-fashioned splices, we mean the twisted joint, soldered and taped varieties. This type of splice is slow and difficult to make and there is constantly the probability of its not having been made properly and that it will eventually cause trouble.

For these reasons, it is usually considered the best practice to remove short main frame jumpers and run new ones rather than attempt a splice of the old.

We are not sure that the splicing of jumper wire will ever prove popular but there is no reason why inside house wire should not be spliced as often as necessary as the saving involved by the use of this method is considerable. Also, there are some cases when the splicing of jumper wire by this new method might be tolerated.





The pre-insulated splicing sleeve shown in the accompanying photograph and drawing makes this formerly difficult task an easy, quick and safe process. The splicing sleeve is covered with a plastic shell which will not crack when the sleeve is compressed but will provide adequate insulation. If desired the sleeve insulation may be the same color as the wire used. Only one operation of the crimping tool is required and the sleeve is firmly in place, and the connection is electrically and mechanically sound.

* * *

There are people who have a lot of fun spelling words backwards to give double meanings, but, to date, they have not been able to do much with RADAR.

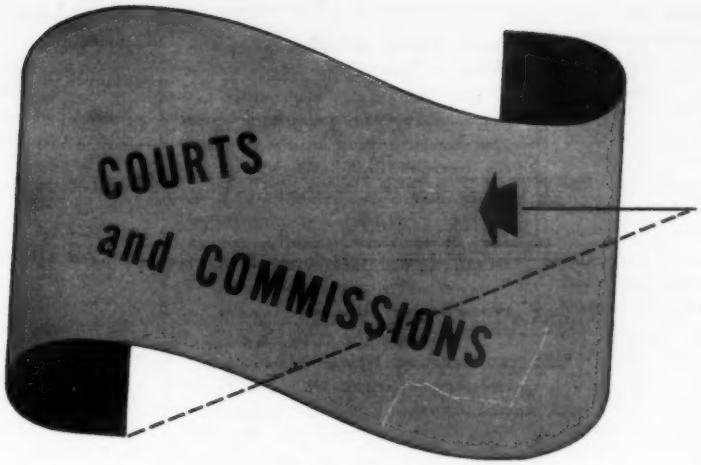
* * *

Some very interesting stories are now coming out of Japan with reference to the telephone service offered in that confused country. One reporter refers to it as the "dial and hope" method and admits that it is actually quicker to use a jeep than the telephone. The operators answer, "Hai! Hai!" which means "Yes" in Japanese. If you say "Hai!" back at her, she says "Just minute, please," and then promptly disconnects you.

George O. Tapper, who has written several articles for TELEPHONY in the past, is now stationed in Tokyo and we expect some first-hand stories from him in the near future.

* * *

We are in receipt of a page from a Swedish telephone directory on which an "x" indicates that the subscriber has his telephone equipped with a voice recorder. A total of three recorders are indicated on this single page.



New York Intrastate Rates to Be Cut

The New York Public Service Commission announced January 3 that the New York (N. Y.) Telephone Co. had agreed to reduce long distance rates within New York State by approximately $600,000 annually. (TELEPHONY, December 29, page 28.) The commission said there was a probability that Independent telephone companies in the state would reduce toll rates by about $50,000 annually.

Reduction of long distance rates by the New York Telephone Co. was agreed upon in negotiations between Milo R. Maltbie, chairman of the commission, and company officials. They are designed to bring intrastate long distance rates more nearly in line with revisions in the interstate toll charges of the American Telephone & Telegraph Co., recently announced.

The commission said it was planned to make the intrastate revision effective about February 1, when the reduction in interstate tolls is to take effect.

The New York company is to reduce its toll charges so that the rate within the state in no case will exceed AT&T charges by more than five cents and at many points it will be the same.

V V

Rate Reduction for North Carolina Independent

The North Carolina Utilities Commission recently announced a reduction in rates of the Hickory (N. C.) Telephone Co. and also revealed that the company has been ordered to eliminate entirely an installation charge on handset telephones of 25 cents per month for 18 months.

The rate reduction, according to Rate Expert Edgar Womble of the commission, was in line with an effort by the commission to standardize telephone rates throughout the state. Under the new rate schedule, residential one-party telephones have been reduced from $2.75 per month to $2.50; residential, two-party, from $2.15 per month to $2.00; business, one-party, from $4.50 per month to $4.25, and business, two-party, from $3.60 to $3.50.

It is estimated that the rate reductions will reduce the company's revenue about $4,000 a year.

V V

Authorize Rate Increase For Illinois Independent

The Illinois Commerce Commission on December 18 authorized the Farina (Ill.) Mutual Telephone Co. to increase rates at its Edgewood exchange and to discontinue free service from Edgewood to St. Peter and Kinmundy, as well as from Farina to Gilmore, Mason, Louisville, St. James and St. Paul. Present and new rates follow:

Class of Service	*Annual Net Rates Present*	*Authorized*
Individual, business	$15.00	$36.00
Two-party, business	15.00	24.00
Individual, residence	15.00	24.00
Two-party, residence	15.00	21.00
Four-party, residence	12.00	21.00
Rural, multi-party.		21.00
Service stations...	4.00	6.00

V V

Orders Bonding of Three Nebraska Commissioners

The Nebraska Board of Educational Lands and Funds, which was given the duty by the last legislature of fixing bonds for all state officers and employes not covered by statutes, recently ordered the three members of the Nebraska State Railway Commission to give bonds in the sum of $7,500. This ends a situation which long has existed, whereby the commissioners were not legally required to give bonds while the statutes required them of subordinate officers.

Attorney General Johnson gave Chairman Larson of the commission an opinion that the fixing of the amount of bonds was entirely within the control of the Board of Educational Lands and Funds, which also may determine whether the bond should be renewed annually or for the term of six years to which each is elected. He added that the board properly could provide that the members be covered by the schedule bond of their department.

V V

Jersey Governor Advocates Ban on Utility Strikes

Opening the New Jersey Legislature, Gov. Walter E. Edge recently advocated measures to require compulsory arbitration of labor disputes that hamper distribution of living essentials, including public utilities.

Recalling the Boston police strike of 1919, Governor Edge said that the principal of outlawing strikes against the government, national, state or local, should be extended. "The time has come to accept the next principle," he said. "It is this: There is no right at any time to strike against the security, welfare and lives of the people —and heat, light, power, transportation, water and food are the life essentials of the people."

Governor Edge advocated the establishment of a special board of public utility arbitration to work out wage scales and working conditions "as easily as a public utility commission today can establish a fair rate to consumers."

Grant Extension for Sale of Central Vermont Properties

The Vermont Public Service Commission on January 7 issued an amended order extending from December 31, 1945, to June 30, 1946, the time limitation allowed the Central Vermont Public Service Corp., Rutland, for disposal of telephone properties acquired from Vermont Utilities, Inc., Chester.

The commission authorized purchase of Vermont Utilities by Central Vermont Public Service in an order issued June 25, 1945, including both electric and telephone properties, but specified that the telephone properties must be disposed of by the end of the year.

In extending the time limit, the new order said it appears that Central Vermont has been unable to find a purchaser of the telephone properties of Vermont Utilities, Inc.; that negotiations are still being conducted, and that Central Vermont has been unable to bring the negotiations to a successful completion within the time limit.

Towns in which Vermont Utilities operated telephone services are Andover, Chester, Springfield, Athens, Grafton, Rockingham, Westminster, Windham, Addison, Bridport, Cornwall, Ferrisburg, New Haven, Panton, Shoreham, Waltham and Weybridge.

Only two villages are listed, Chester and Saxtons River, which is in the town of Rockingham.

V V

Order Service Improvements By Minnesota Independent

As a result of a formal complaint on inadequate telephone service being rendered subscribers of the Northwestern Minnesota Telephone Co., Karlstad, the Minnesota Railroad & Warehouse Commission on January 10 ordered the company to make the requested improvements or show cause within 20 days why such relief should not be granted.

The complaint, signed by many businessmen and individuals, stated: (1) Lines are not in shape nor telephones serviced sufficiently to render proper service; (2) the switchboard setup is too small for the volume of business handled; (3) 24-hour service should be given instead of the present part-time service, and (4) many patrons do not intend to pay for the present inadequate service.

V V

J. L. Kirk Buys Greenville, Ala., Telephone Franchise

The Greenville (Ala.) City Council recently approved the sale of the telephone franchise by Geo. A. Crenshaw, owner of the Greenville Telephone Exchange, to the Greenville Telephone Co., owned by James L. Kirk, Moultrie, Ga.

Mr. Kirk took over the 50-year-old exchange on January 1.

The new owner also owns the United Telephone Co., which recently was purchased (TELEPHONY, November 10, page 41.) This was formerly the Standard Telephone Co., and serves Dothan, Andalusia, Ozark, Enterprise, Elba, Slocomb, Hartford, Geneva and Brundidge, Ala. Mr. Kirk has systems in 35 cities in Alabama and Georgia and others in Illinois.

V V

Kandiyohi, Minn., Independent Buys Telephone Properties

The Kandiyohi County Public Service Co., Waverly, Minn., on January 10 was authorized by the Minnesota Railroad & Warehouse Commission to purchase from the Edwards Mutual Telephone Co. and the Progressive Telephone Co. properties held by these companies in the vicinity of Raymond, Kandiyohi County.

The commission ruled that, inasmuch as the Kandiyohi company proposed to metallicize the lines and render complete dial service at the newly purchased properties, its Raymond exchange rural rates now on file with the commission would become effective in this area upon installation of dial.

V V

Northwestern Bell Buys Bemidji, Minn., Property

Northern Township, Beltrami County, Minn., was authorized January 10 by the Minnesota Railroad & Warehouse Commission to sell all its telephone properties located in Beltrami County, including property in Lake Bemidji, to Northwestern Bell Telephone Co.

Findings revealed that Northwestern Bell owns and operates an exchange at Bemidji from which rural and toll lines radiate, and that Northern Township's rural lines include the property located within the special rate area at Bemidji. The sale was desired by the township to relieve overload on rural township lines and to permit the removal of 17 multi-party service subscribers from the rural lines, thereby improving service for the remaining subscribers.

Northwestern Bell was authorized to make effective on the newly purchased property, rates now in effect for similar service provided from the Bemidji exchange, and the 17 subscribers agreed to take six-party service at the established rates. No consideration was given as to the value or price paid for the telephone property.

V V

Sells Florida Independent To Southern Bell

Sale of the Milton and Jay Telephone Exchange plants and franchises to the Southern Bell Telephone & Telegraph Co. was approved January 9 by the Florida Railroad Commission.

The property was sold by Mrs. Ruby Mae Williams.

The commission said all rates and charges for the telephone service will remain the same under the new ownership.

V V

North Dakota Independent Asks Higher Rates

A hearing involving the increasing of rates of the Shepard Farmers Co-Operative Telephone Co., Walhalla, N. D., was held December 20 at Cooperstown before the North Dakota Public Service Commission.

The company's increased operating costs, it was claimed, makes it imperative to raise service charges if the company is to maintain its present service.

V V

Sells Switchboard at Spring Hill, Iowa

After 27 years' ownership of the Spring Hill (Iowa) telephone switchboard A. M. Weeks recently sold it to Mr. and Mrs. James Wood.

The sale also included two rural party lines and the telephones in Spring Hill. Two additional co-operative lines are switched through the Spring Hill board. The board also has switching connections with Northwestern Bell, giving it an outlet to the whole country.

Best Story of the Week—What's Yours?

The following best story is about a private telephone line that turned out to be a very public line instead:

Mr. and Mrs. Paul Fleming of Kansas City, Mo., after waiting for three years, finally got a telephone installed in their home — and on a private line, they thought. But they were wrong.

It developed that the lineman had connected their telephone to the line of Braniff Airways, Inc., and all the Flemings' conversations went out over the Braniff radio transmitter to planes and stations everywhere.

Introduces Tax Repeal Bill

A bill was introduced January 9 in the 1946 Kentucky Legislature by Sen. G. S. Milam of Logan which would appeal a 3 per cent tax on telephone, gas, light and water service.

V V

Massachusetts Appoints Burns

JOSEPH K. BURNS, personnel assistant in Boston, Mass., for the New England Telephone & Telegraph Co., has been appointed state director of personnel by the Massachusetts Commission on Administration and Finance, subject to final approval by the executive council.

V V

Summary of Commission Rulings and Hearings

California Railroad Commission

January 4: Authorized Jane R. Thompson, Thompson Telephone Co., Halcyon, to sell telephone properties to Howard F. Hanst and Oren F. Henderson, Arroyo Grande, San Luis Obispo County.

Illinois Commerce Commission

January 8: Hearing on request for increased rates at Golden (Ill.) Farmers Telephone Co.

January 8: Hearing on application of Tampico (Ill.) Farmers Mutual Telephone Co. for authority to file changes in schedule of exchange rates on less than 30 days' notice.

January 9: Hearing on request of Shiloh (Ill.) Mutual Telephone Co. for authority to increase rates.

Kansas Corporation Commission

January 7: Hearings continued on applications of John and Edna F. Cramer for permission to transfer franchise and cease operating Spivey (Kan.) Telephone Exchange, and of Archie D. and Hazel I. Adams for certificate of convenience and authority to do business there.

January 7: Held for 1945 report, etc., application of Fairview (Kan.) Telephone Co. for authority to make rate changes.

January 7: Held for 1945 report, etc., application of German-American Telephone Co., Victoria, for authority to make rate changes.

January 8: Heard and advised American Telephone Co.'s application for authority to install common battery service at Dighton and to file new schedule of rates.

February 1: Hearing continued on complaint of Charles Smith against service of Cedar (Kan.) Telephone Co.

Louisiana Public Service Commission

January 15: Hearing concerning discontinuance by Southern Bell Telephone Co. of service in territory of Louis Peranio, doing business as Star Telephone Co.

New York Public Service Commission

January 16: Hearing on petition of Coxsackie Flats Telephone Co. for sale to State Telephone Co., Coxsackie.

Oklahoma Corporation Commission

February 20: Hearing continued on application of Farmers Mutual Telephone Co., Weatherford, for authority to make extra charge on long distance calls through Southwestern Bell.

V V

Pay-Station Directory Loss Publicized by Ohio Bell

Confident that the public should have a deeper appreciation of the telephone directories which it finds at pay-stations, the Ohio Bell Telephone Co. recently gave to Ohio papers some interesting information describing the terrible beating that the directories take from pay-station patrons. Other telephone companies that continually find their pay-station directories mauled, mutilated, doodled, smudged and, last but not least, stolen might find a partial cure by obtaining the cooperation of their local papers in printing stories on the problem similar to this sample of Ohio Bell's publicity:

The next time you enter a pay telephone booth to find a directory with a missing page or lost cover, you may know that already the big book has received the kiss of death and is headed

ELEPHONE WIRE
It's Known,
Liked,
Preferred
Give maintenance and installation men G-E Telephone Wire to work with. They know it, like it, prefer it. They know it because millions of feet of it are already in use, giving trouble-free service. They like it because it is easy to handle, to install; and they prefer it, because it helps produce a neat, quick job.
G-E Telephone Wire, rigidly inspected and built to severe standards, is available with either two or three conductors. For indoor use, it comes with a glazed cotton finish. For outdoor use, it has a rugged exterior jacket of heavy braid, mica-flaked, with a weatherproof finish.
For more information, write to Section W1615-4, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn.
GENERAL ELECTRIC

for a premature grave in the paper salvage scrap heap.

Wear and tear on telephone directories always has been terrific, and usage during the war has increased. Particularly in bus and railroad stations they are mauled, mutilated, doodled and smudged, and stolen.

On some days, after John Q. Public has had a busy week end, as high as 20 directories may be replaced in pay-stations by the Ohio Bell Telephone Co. During the past year, 110,000 directories were printed which last spring supplied roughly 90,000 Toledo area subscribers.

As a rule, telephone books other than those in pay-stations, are replaced only upon request. Home "wear and tear" is surprisingly light, and many pay-stations also have an excellent record.

But the few "bad boy" stations keep collectors busy replacing directories. Too often when they visit the booth to make collections, they discover the book has vanished. Out-of-town travelers in particular seemed possessed of uncontrollable desire to have a Toledo directory for their very own.

Such directories may be purchased from the company office at 40 cents each, according to W. L. Harris, assistant commercial manager, but few avail themselves of the privilege.

Most destructive is the book ripper, a self-satisfied fellow who always takes what he wants—frequently a few pages listing the hotels, the theaters or places of interest. Unfortunately, other telephone users also are interested in those pages.

New directories are not scheduled for distribution before May, but the company, familiar through sad experience with the habits of directory mutilators, has a surplus deemed ample for ordinary needs.

If history runs true to form, when the old directories are picked up, the company will receive many calls from worried subscribers who inadvertently have left articles, important papers or money between the pages.

"There's nothing we can do about it," said Mr. Harris. "After being collected, the directories are never examined. They are taken directly to the freight yard and dumped into a box car for shipment.

"However, the company always assures the owner of the lost article that he may, if he wishes, personally examine the collected directories or employ someone to do it for him. Such a search usually involves thumbing through 50,000 directories more or less."

V V

Explains Service Headaches To Independent's Subscribers

W. J. Holloway, general manager of the Home Telephone Co., Smithfield, Va., in a holiday letter to company subscribers, thanked them for their patience and understanding during the four trying years of war, and asked for a continuation of that consideration in the return to service normalcy.

The letter explained that continued labor and material shortages make it hard to catch up with deferred replacements and additions, and that it will take time to supply the more than 200 applicants awaiting service, which will require, in addition to telephones, new circuits, cables and trucks, additional labor and new and more central office equipment.

The letter stated that these demands applied only to service applications; however, with every additional telephone added to the system, toll lines must be reappraised to determine overall toll circuit requirements. With the toll circuits now carrying excessive loads, additional toll channels must be provided.

V V

Exchange Destroyed by Fire

The Rutherford (Tenn.) Home Telephone Co. was destroyed by flames January 1, bringing telephone service in the vicinity to a standstill, when fire razed the three-story building in which the exchange was housed. The telephone company was owned and operated by Mr. and Mrs. Spence Crouse.

V V

Answers to Traffic Questions on Page 22

1. Please refer to preface for your answer.

2. The information that calls are being transferred should be given to the distant operator.

3. If a second alternate route is provided, enter it on the line directly below the "alt. route" space as, for example, "second alt. (route)."

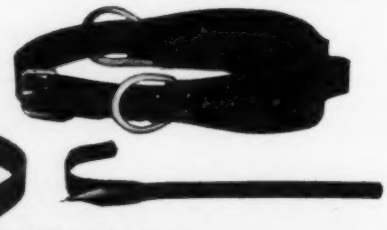
4. Rotating operators' tricks permits equitable distribution of force experience and enables every operator to work the desirable as well as the less desirable tricks. Rotating tricks also has a bearing upon force losses. New people are more inclined to remain with the telephone company where operators' tricks are rotated.

5. This could be due to failure to hold delayed calls at a "delayed call" position. It has been observed that, in some offices, delayed calls are kept at CLR position and CLR operators make subsequent attempts on delayed calls. Where this practice is followed, it results in delay in locating the ticket when a WH party report is received.

Play Safe!

Working aloft in all kinds of weather, the telephone lineman deserves the safest equipment that money can buy. Give him confidence in his own safety, by providing him with belts, straps and climbers made by KLEIN—producers of fine linemen's tools since 1857. Telephone men everywhere recognize this name as a synonym for complete reliability—so, for safety's sake, always

Specify KLEIN



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AUTOMATIC ELECTRIC SALES CORPORATION

1033 WEST VAN BUREN STREET, CHICAGO 7, ILLINOIS

Middle States Employes Commended for War Effort

Approximately 75 employes and guests of the Pekin district of the Middle States Telephone Co. of Illinois recently celebrated their first postwar Christmas with a dinner at the Pekin Country Club.

The guests included Mrs. Mayme Workman, traffic supervisor of the Illinois Telephone Association, Springfield, and traffic editor of TELEPHONY, and operators from the private branch exchange switchboards serving industries in Pekin. Earlier in the day Mrs. Workman had conducted an operators' school for PBX operators.

Verne Clark, Pekin district manager, acting as master of ceremonies, expressed appreciation for the war effort of the plant, traffic and commercial departments, which he termed as especially loyal and meritorious, and acknowledged the work of those who have spent 10 years or more in telephone work as being a most important and stabilizing factor.

V V

Associated Company to Spend $10,000,000 on Expansion

A three-year expansion program under which the Associated Telephone Co., Ltd., Santa Monica, Calif., will spend $10,000,000 to improve the service now rendered to its customers in 40 California communities was announced December 29 by Charles E. Mason, president of the company.

Telephone service for 32,000 waiting applicants, at a cost of $4,700,000, is included in the program, Mr. Mason said. Items include $1,731,000 in station equipment and apparatus, $1,125,000 in pole lines, wire and cables, and $987,000 in switchboards and dials. Land and buildings will cost $757,000 and general equipment, $109,000.

Santa Monica, Long Beach, West Los Angeles, Pomona, Covina, all of Santa Barbara County, Ontario, San Bernardino and Laguna Beach are among the areas served by the Associated company.

V V

Wins Legion of Merit

Col. Van Ness Philip, commanding officer of the Signal Corps Contract Settlement Agency, Philadelphia, Pa., recently was awarded the Legion of Merit for services rendered in the capacity of commanding officer of the Monmouth Signal Corps Procurement District at Bradley Beach, N. J., from June 7, 1943, to September 30, 1945. The citation was awarded by Brig. Gen. E. H. Clewell, chief of the Procurement and Distribution Service, Office of the Chief Signal Officer.

Yours for the Asking

This New Engineering Manual for Long-Span Lines

Pertinent and timely information on how to build long-span, low-cost rural lines of *Crapo* High-Tensile Telephone Line Wire is contained in this new, illustrated Manual. The book is designed especially to assist operating companies in furthering their plans for extending and improving rural service.

The contents include electrical and physical characteristics of both *Crapo* HTL-135 and *Crapo* HTL-85 Line Wire; tables of stringing sags and tensions; recommended construction practices; information on guying, metalicizing and transposition, river crossings, etc.

If you have not received a copy of this manual, be sure to ask for one! Direct your inquiry to your distributor of *Crapo* Galvanized Telephone Wire and Strand, or write us!

Crapo HTL-135 Telephone Line Wire possesses two and one-half times the strength of standard B. B. wire; makes practicable spans of 350 feet in heavy loading to 500 feet in light loading districts. *Crapo* HTL-85 permits spans of 225 feet in heavy loading, 375 feet in light loading districts.

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

Crapo HIGH-TENSILE TELEPHONE LINE WIRE

ATOMIC BOMB PLANTS REQUIRED TELEPHONE SERVICE

WHEN the first atomic explosion annihilated Hiroshima, telephone people in the states of Tennessee and Washington stood back and gasped: "So that's what's been going on here!"

The first hint that the Southern Bell Telephone & Telegraph Co. employes in Tennessee had of things to come, reports *Long Lines*, occurred on a brisk day in October, 1942, when a supervisor for the Army Engineers walked into the business office in Knoxville and casually asked the service representative for an 80-line switchboard and 100 telephones, priorities or no priorities. That would serve as a start, he pointed out, but he expected he would soon need a PBX to serve 5,000 telephones from Knoxville, over 100 trunks!

"But where do you want the telephones?" stammered the surprised service representative.

"About 200 miles west of here, on Black Oak Ridge," replied the army man.

It was a year later, in March, 1943, when a representative of the prime contractors arrived in the state of Washington and gave telephone people there a preliminary outline of the staggering amount of telephone facilities which would be needed by the second of the huge atom bomb plants—this one to be known as the Hanford Engineer Project.

As was the case in Tennessee, the Hanford site was chosen because of its proximity to power and its remoteness. In Tennessee, the TVA-operated Norris Dam was capable of furnishing the tremendous amounts of electricity required. In Washington, there was the Columbia River with its Coulee and Bonneville dams, two of the nation's biggest sources of power.

Working under top priority in producing telephone supplies for the Oak Ridge, Tenn., project, the Western Electric Co.'s Kearny, N. J., works and its Hawthorne plant in Chicago manufactured and shipped the required equipment.

Throughout the bitter winter of 1942-43 and the following summer, telephone people labored alongside thousands of construction company workmen to create a city from scratch. A central office was erected as were a garage and storehouses for the vast amount of telephone equipment and material needed for the brand-new city of 75,000. Southern Bell met the Army's every request, and on time!

Recently the new Oak Ridge telephone plant was handling 132,000 local calls and 1,500 outgoing long distance messages daily from 9,000 telephones.

Similar construction difficulties were faced in Washington by three companies—the Pacific Telephone & Telegraph Co., Columbia River Telephone Co. and Kennewick (Wash.) Valley Telephone Co. Contributing to the difficulties were: The remote site 40 miles from Yakima on an undulating tableland consisting for the most part of gray sand, green-gray sagebrush and dried water-courses; the distances involved within the 695 square mile reservation, the ever-pressing need for speed and the extreme requirements for military secrecy.

Indicative of the telephone group's resourcefulness was the manner in which submarine cables were pulled across the raging Columbia River. Construction men rigged a reel of strong steel wire in the stern of a rowboat and sent two men across the 1,700-foot stream, one at the oars and the other tending the reel. After reaching the opposite bank, the wire was used to pull across a 25-M strand, to which in turn was fastened the heavy 26-pair double armored cable. With a powerful army tractor assisting, the cable was pulled across the river.

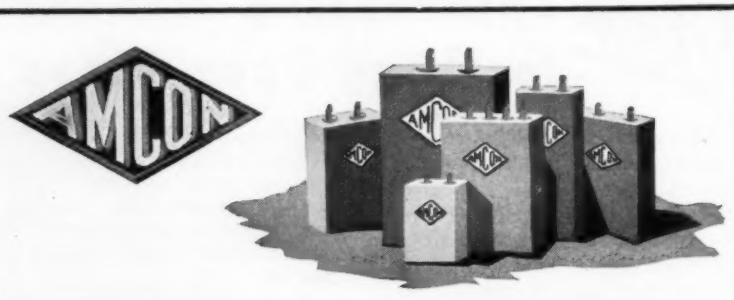
As it does at Oak Ridge, the Army Signal Corps operates the telephone system within the Hanford reservation. There are an 18-position and a 13-position switchboard and 15 satellite PBX boards. Foreign exchange service is supplied to surrounding cities and teletypewriter service to eastern points.

V V

Sampson Succeeds Carll as Bell's Iowa Manager

Clifford L. Sampson, who has been assistant vice president at Omaha, Neb., of the Northwestern Bell Telephone Co., has been appointed general manager for the state of Iowa. He succeeds I. G. Carll, who has retired after 43 years of service.

Mr. Sampson began as a groundman in the plant department at Minneapolis, Minn. In 1939 he was made plant engineer for Minnesota, and a year later became chief engineer in Iowa. During 1942 he was special ad-



FOR DEPENDABLE RELIABLE SERVICE

AMERICAN TELEPHONE AND TELEGRAPH CONDENSERS

SPECIFICATION SHEETS ON REQUEST

AMERICAN CONDENSER CO.
4410 No. Ravenswood Ave., Chicago 40, Ill.

viser in the production division of the War Production Board at Washington.

Mr. Carll, who has been general manager for Iowa since 1935, began as a clerk in Des Moines, and later become general manager for Dakota. Since 1942 he has been a vice president and a member of the company board of directors.

V V

Moravia (Iowa) Telephone Co. Sold to Don E. Wolf

Don E. Wolf of Keosauqua, Iowa, on January 1 took possession of the Moravia (Iowa) Telephone Co. which he purchased from George Spangler.

The new owner has been manager of the Van Buren County Mutual Telephone Co. at Keosauqua for 20 years.

V V

Ohio Bell Engineer Recalls Scene Pictured in "Telephony"

The telephone switchboards used in France in 1918, pictured in TELEPHONY's special issue of November 24, 1945, honoring the communications feats of the Marine Corps, Coast Guard and Naval Seabees, recalled to V. A. Diggs, plant extensions engineer of the Ohio Bell Telephone Co., memories of his own experiences in World War I.

In a letter to TELEPHONY, Mr. Diggs, formerly a captain in the B company, 117th Field Signal Battalion, gives a graphic description of TELEPHONY's illustration which appeared on page 27, lower left hand corner, as follows:

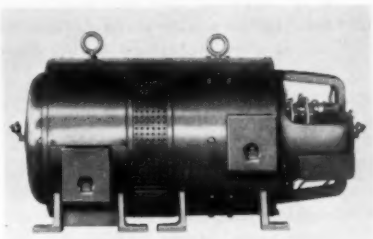
"I was standing about two feet to the left edge of this scene when it was taken. The date was about September 16, 1918; the place, Essy, France, north of Toul, east of Mont Sec. The one-position, 40-line board in the foreground was an Army Corps telephone center. The two positions on the left in the background were the 42nd (Rainbow) Division headquarters telephone center.

"The two men seated at the right rear are telegraph operators. All men but the Army Corps operator were from B company, 117th Field Signal Battalion. General MacArthur commanded one Infantry Brigade of this division at the time this photograph was made, having just been promoted from Colonel, Chief of Staff of the division.

"We removed the German telephone set from Chateau Benoit, a captured German Army Corps headquarters, a day or so before. General MacArthur used this chateau for a few days, but had to move out because it was shelled heavily. This set is now in the hands of Col. Ruby D. Garrett of Kansas City, formerly division signal officer. One of our B company men, Philip Niclas, now lives at 5728 Leonard Ave., Chicago. He is with the Illinois Bell Telephone Co."

Users say

"DIVERTER • POLE CHARGERS ARE TOPS"



Recently, we asked a few of the long-time users* of E.P. Diverter-Pole Motor-Generators, "What is your opinion of the Diverter-Pole Motor-Generator?"

...Here are the answers:

USER	ANSWER	"DIVERTER-POLE INSTALLED"
A	"We have had very satisfactory service from our generator."	1932
B	"A very positive, efficient and reliable source of power."	1931
C	"We have found it to be very satisfactory."	1925
D	"Good Generators."	1928
E	"Tops."	1926
F	"Very dependable."	1928
G	"This type of machine has proved excellent for charging purposes and maintaining constant voltages."	1926

For the most reliable, maintenance-free and efficient source of direct current, specify E.P. Diverter-Pole Motor-Generators.

**Names on request* WRITE FOR BULLETIN 96-A

EP X-11

THE ELECTRIC PRODUCTS COMPANY

1727 CLARKSTONE ROAD CLEVELAND 12, OHIO

ELECTROX BATTERY ELIMINATORS will make MONEY for you!

Here's what you have been waiting for! A dependable, low-cost battery eliminator that would do away with the costly, trouble-some service trips necessary to replace worn-out dry cells.

This new Electrox Battery Eliminator — only 2½" in diameter, 3" high — replaces two dry cells, and provides smooth, noiseless current for the operation of a magneto telephone.

It operates directly from the 110 volt, 60 cycle lighting circuit and takes the place of the two dry cells now used. Easy to install. Quality made for a long life of dependable service. Costs only $4.12. Ask for Electrox A3V.

Replace Operator's Batteries

with

Long Life

ELECTROX BATTERY ELIMINATOR

TYPE PA-05004

Plugged into your light circuit, the PA-05004 will deliver a constant, humless direct current to the operator's circuit on magneto switchboard. In case of power failure, Power-off Relay automatically transfers operator's circuit to stand-by dry cells.

Other Electrox models are available for Lamp Signal (PBX), and Automatic (PAX) Systems. Capacities of 0.5 to 6 amps, from 12 to 48 volts.

Write for Cir. 443
Order from your Jobber.

ELECTROX DIVISION

SCHAUER MACHINE CO.

2057 Reading Rd. • Cincinnati 2, Ohio

VETERANS WANT TELEPHONE WORK

IN AN effort to be of assistance to returning veterans, as well as to telephone companies which have a manpower shortage, we expressed to the Office of the Chief Signal Officer of the Army our willingness to publish the names and addresses of Signal Corps men who desire to enter telephone work. The Chief Signal Officer accepted our offer and advertisements were run in the post papers of Fort Monmouth, N. J., and Camp Crowder, Mo., announcing our plan. To date we have received letters from the following Signal Corps men, asking that they be listed. It is suggested that any telephone operating or manufacturing company desiring men with their qualifications write them immediately. (Previous names were published in the November 3 and 17, December 1, 15 and 29, and January 5 issues.)

* * *

HARRY N. HOSACK, 815 EAST 17th AVE., DENVER, COLO. Discharged. Interested in making telephony his occupation. Four years' Army experience in radar maintenance and telephone and telegraph wire chief duties. Prefers operating company but will consider telephone manufacturing.

* * *

FRANK WALDEN, 1068 MIDWAY PARK, CAMP LEJEUNE, N. C. Recently discharged from the Third Marine Division, in which he did radio and telephone work for 3½ years. At present he is with the Civil Service as mechanic electrician. Age 25; married; one child. Free to go to any part of the country.

* * *

SGT. J. C. KEHOE, 616 E. 77th ST., CHICAGO, ILL. Eligible for discharge February 1. Has had three years' experience in installing and repairing telephones—one year in civilian life and two years in Signal Corps.

* * *

PFC. HOWARD G. MONTAGUE, 1263 RD. S. C. V., DEL., MASON GENERAL HOSPITAL, BRENTWOOD, LONG ISLAND, N. Y. Expects to be discharged soon. Communications work in Army consists of line work and repair of telephones and switchboards. Would like opportunity to become lineman and trouble-shooter with operating company.

* * *

JOHN J. KELLEY, 218-43 94th RD., QUEENS VILLAGE, LONG ISLAND, N. Y. Expects to be discharged from Marine Corps in April. Will have concluded 45 months as a telephone line and maintenance man. Desires to continue such work and is particularly interested in the installation and repair of telephones. Believes basic schooling in electronics with further training will fit him for work with commercial company. Enrolling in the Marine Corps Institute to take electronics course from Bell System manuals.

* * *

LOUIS DI GIACINTO, 7903 ATLANTIC AVE., MARGATE, N. J. Four years' experience in various phases of army radio, and two years prewar broadcasting and additional radio servicing experience. Holds first class radio-telephone operator's license. Resume of experience, education, etc., furnished on request. Is captain in Officers' Reserve Commission.

* * *

ARNOLD SHAYNE, 314 W. 94th ST., NEW YORK 25, N. Y. Disabled veteran. Wants work with future in communications. Three and one-half years cryptography, teletyping and message center work in Signal Corps. Desires immediate employment.

* * *

NORMAN J. GRANT, 21 TAPPAN ST., MELROSE, MASS. Wants employment with operating company with ultimate opportunity to travel, preferably outside U. S. Experienced in installation and maintenance of central office equipment. Recently discharged.

* * *

JAMES D. HEADRICK, JR., 112 N. MASS. AVE., ATLANTIC CITY, N. J. Was radio operator in Coast Guard for 30 months. Interested in operating job. Was radioman 1/C (operating) at time of discharge and wants to further knowledge and ability as operator. Does not hold commercial or amateur license.

ABC of the Telephone

(Concluded from page 20)

particular section in the next installment.)

If, during a cross between the series street lighting circuit and the telephone line, a telephone fuse should blow, the voltage might rise to an abnormally high potential across the open fuse and, as a result, present a serious fire hazard. Such a condition arises because it is characteristic of a series street light circuit that the voltage will build up across any gap or break that may appear in the series circuit.

(To Be Continued)

V V

Independent Pioneers Plan New Membership Drive

President R. W. Siemund of the Independent Pioneer Telephone Association, in announcing the association's new membership committee, revealed plans for an active drive for new members. All association members soon will be requested to aid the committee in inviting eligible Independent telephone men and women to join the organization, he stated.

F. M. PARSONS

Committee appointees are as follows: F. M. Parsons, Chicago, chairman; R. G. Faulhaber, Chicago; L. L. Ruggles, Chicago; T. C. Thompson, Rochester, N. Y.; W. H. Walter, Galion, Ohio, and Mayme Workman, Springfield, Ill.

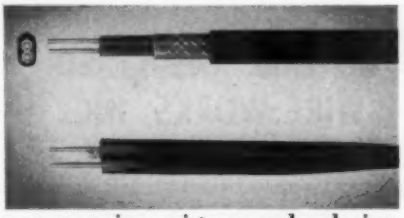
WIRE and CABLE

Among the many kinds of telephone wire and cable you can get via Graybar are those described below.

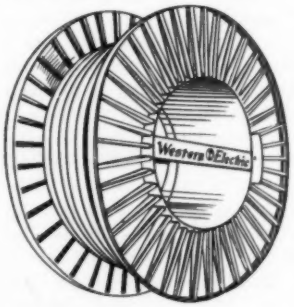
Turn to Graybar for *all* your telephone supplies. The Graybar Telephone Specialist near you offers expert aid in their selection and application, and delivery from our near-by warehouse will often save you time. That goes for lighting fixtures and lamps, too. We offer the widest selection available anywhere. *Graybar Electric Company. Executive offices: Graybar Building, New York 17, N. Y.*

4608

TELEPRENE DROP WIRE



This new type of Whitney Blake Long Life Drop Wire has no outer braid—because none is needed. The tough outer jacket (on both parallel and twisted pair) is highly resistant to weather and is also flame-resistant. Other advantages are higher compression resistance and enduring adhesion between insulation and conductors.



WESTERN ELECTRIC TELEPHONE CABLES

Included in this line — engineered and produced by the pioneer and leader in telephone-cable development — are (1) lead-covered, pulp-insulated cables (quadded or non-quadded) for aerial or underground uses; (2) lead-covered, textile-insulated switchboard cables; (3) single and double wire-armored submarine cables.

"Endurance"
TELEPHONE WIRES
RUBBER—PLASTIC

DROP—BRIDLE—INTERIOR
DUCT—FIXTURE—TREE
GROUND

Our personnel is experienced in working to exacting specifications, utilizing advanced techniques and modern equipment.

For prices and delivery direct inquiries on your requirements to

GENERAL INSULATED
WIRE WORKS, INC.
PROVIDENCE, RHODE ISLAND

FOR
LACING CABLES
and all other purposes requiring a superior waxed twine.

THE BARBOUR PRODUCTS
Division of
THE LINEN THREAD CO., INC.
60 East 42nd St., New York 17
Boston (10) Chicago (10) San Francisco (5)
Gloucester Philadelphia (6) Baltimore (3)

Toll Dialing

(Concluded from page 30)

2.052 Start Dialing Signals. When the trunks terminate in line equipment, start dialing signals should be provided. The start dialing signal informs the operator or sender when to stop and start dialing. The stop-dialing indication is an off-hook supervisory signal while the start-dialing indication is an on-hook signal. In some cases subscribers in community dial offices may be reached by way of a tandem office of the community dial office type. If toll line dialing is involved, in this case, only one of the series of trunks used to reach the terminating office should be connected to a line circuit, as the sender at the toll office is not arranged to accept more than one start dial signal between digits.

2.053 Busy Signals. Visual flashing signals to indicate to the outward toll dialing operator when the called line is busy should be provided at the tributary office. This flashing signal should be at a 60-IPM rate with busy tone.

Visual flashing all trunks busy signals are also desirable since, if the same flashing signal is used for both line busy and all trunks busy conditions, a false report may be given to the calling subscriber. The operator would continue to attempt to complete the call unless instructed otherwise by the calling subscriber. The flashing signal should be at a 120-IPM rate without tone.

2.054 Audible Ringing Signal. Audible ringing signals should be provided on connections to subscriber's lines in order to inform the outward operator that the called line is being rung.

2.055 Common Battery Supervision. Common battery supervision should be provided on all subscriber lines terminated in the tributary dial office. This feature provides the outward toll operator with cord lamp supervision required for timing the call. Where magneto toll stations are involved they should be converted to common battery supervision and terminated on the tributary dial equipment or reterminated at the toll center. This will avoid the need for monitoring at the toll center on any calls to and from stations connected to the dial tributary.

2.056 Intercepting. Because of the cost of this type of equipment it is ordinarily limited to offices having 500 or more lines. It is felt, however, that this service should be provided in all offices adjacent to Metropolitan areas.

In offices not equipped for intercepting service a uniform distinctive signal is desirable when a vacant line terminal is reached. Signals used for other purposes such as line busy or audible ringing should not be used for this purpose since they give the calling party and operator false indications. If a distinctive tone cannot be given the equipment should be arranged so that no signal is returned on the call.

Calls to vacant levels or codes within the dial office should receive the same treatment as calls to vacant terminals.

(To Be Continued)

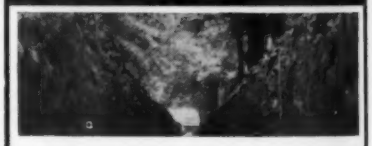
V V

H. F. Richter Advanced By Southern New England Bell

Horace F. Richter has been appointed employment manager for the Southern New England Telephone Co., with headquarters at New Haven, Conn.

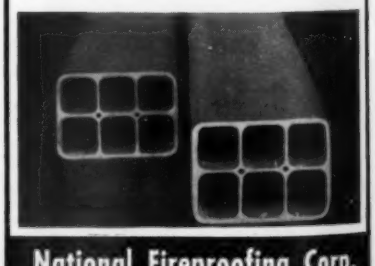
Mr. Richter joined the company in 1924 as a clerk and became traffic manager at Bridgeport in 1934. For the past 10 years he has been located at New Haven. Seven full-time employment offices are under his supervision.

SINCE 1889
NATCO
CLAY CONDUIT



The proved and standard Protection for Underground Telephone Cables.

Cheapest in the long run. Highest quality and a full line of shapes.



National Fireproofing Corp.
202 E. Ohio Street, N. S.
PITTSBURGH, PA.

W. S. Cadwell Resigns As Leich Vice President

Walter S. Cadwell recently announced his resignation as vice president of Leich Sales Corp., Chicago. Mr. Cadwell had been with the Leich organi-

W. S. CADWELL

zation since 1938 and was elected vice president in 1940. Throughout the war he had acted as contact man for the Leich Electric Co. in the sale of the company's equipment to the government.

Prior to joining the Leich Sales Corp., Mr. Cadwell had been employed in advertising work by several of the companies in the Gary Group. He started his telephone career in 1926 in the purchasing department of the American Electric Co. and later was placed in charge of its advertising. From 1931 to 1933 he worked for the Loomis-Clapham Co., an advertising agency, and when it was dissolved, joined the advertising department of Automatic Electric Co.

Mr. Cadwell made no announcement of his future plans beyond stating that he would establish an office after February 1, at 737 North Michigan Ave., Chicago.

V V

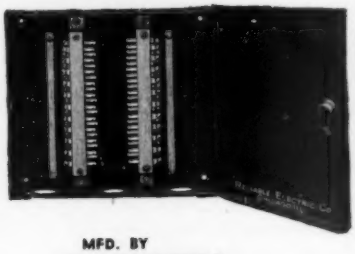
"Sun Dial" Wins Honorable Mention in Annual Contest

The *Sun Dial*, miniature monthly publication of the Peninsular Telephone Co., Tampa, Fla., recently received honorable mention in an annual contest sponsored by the Direct Mail Advertising Association.

Edited by J. Hartwell Jones, the *Sun Dial*, which has been in existence for almost 15 years, is enclosed with subscribers' monthly telephone bills.

STROMBERG-CARLSON
Recommends...

THE
RELIABLE
BUILDING
TERMINAL BOX



MFD. BY
RELIABLE ELECTRIC
COMPANY

A practical, efficient way of terminating and distributing cables is to use the Reliable Building Terminal Box.

This box is available in capacities to handle from 11 to 104 pairs and with choice of two types of terminal strips:

1: Type "E", with screw binding posts on one side and soldering terminals on the other.

2: Type "T", with screw binding posts on both sides and one soldering washer.

Over 35 years service to the telephone industry.

HABIRSHAW

No. 17 Bronze Drop Wire

Distributed Exclusively by
STROMBERG-CARLSON

High strength bronze conductor . . . expertly blended synthetic rubber insulation . . . soft, unbleached cotton braid, thoroughly saturated to provide a long-lived moisture-resisting covering.

A Quality Product Made by

Phelps Dodge
Copper Products
Corporation

Habirshaw Cable and Wire
Division

STROMBERG-CARLSON COMPANY
Factory and General Offices: Rochester 3, New York, U.S.A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Kellogg Switchboard Elects New Officers

Important changes in the executive personnel of Kellogg Switchboard & Supply Co. were effected January 15 with the election of James H. Kellogg, former vice president and secretary, to the office of president succeeding his father, James G. Kellogg who becomes chairman of the board.

Other new officers of the company are Harry C. McCluskey, executive vice president and treasurer; Claude D. Manning, vice president and secretary and Harvey O. Edson, assistant treasurer and secretary.

The board of directors is composed of James G. Kellogg, chairman; James H. Kellogg, J. J. Bryant, Jr., John P. Hooker, S. Ashley Guthrie and Curtis B. Camp.

James H. Kellogg, the company's new chief executive, started as an order clerk in 1936 and progressed through various positions to that of works manager in 1943, later becoming vice president and secretary. As works manager during the war period he had complete charge of all production activities including those of a secret nature for the government.

dependable
Cedar Poles
MICHIGAN POLE & TIE CO.
NEWBERRY—GRAND RAPIDS
MICHIGAN

Cedar Poles
MAC GILLIS & GIBBS COMPANY
Wells Bldg., Milwaukee 2, Wis.
★ ★
Northern White and Western Red
Cedar Poles—Plain or Butt-Treated

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

Pensacola Creosoting Company, Pensacola, Fla.—Creosoted Southern Pine. Poles of Superior Long Leaf Quality.

In the Nation's Capital

(Concluded from page 27)

FCC proceedings are all about—to see what should be done.

From the testimony so far produced, and the little clews so far thrown out about the probable attitude of the FCC, this reporter's guess is that the outcome of this proceeding will be something like this: An FCC order making illegal the use of recording instruments with telephone conversations unless some form of positive notice is given to the parties to the conversation that a recording is or may be made. The details of how best to accomplish such notice may be left for the telephone companies and recorder manufacturers to work out. Informal notice, such as agreement between the parties, would be sufficient. But how to prove and arrange this on a foolproof basis looks like a whale of a problem from here.

Maybe something can be accomplished in the way of education to inculcate in the public more sensitivity towards the lack of morality or even elementary good manners in engaging in unauthorized recording of telephone conversation. At best, it is eavesdropping. At worst, it could be almost anything—beginning with blackmail.

Regardless of what the law or the FCC may decide, there seems to be shaping up here a job to challenge the public relations efforts of the industry. It can be done, if the people understand the problem clearly enough.

V V

>> *Nothing is easier than fault finding; no talent, no brains, no character are required to set up in the grumbling business.*—**Robert West.**

WE BUY
WE TRADE
WE REBUILD
Old telephones or parts into smart modern-looking wall phones or desk sets with new cabinets.
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Specialists in Repairing and Rebuilding Transmitters
The Telephone Repair and Supply Co.
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PLANTS AND OFFICES:
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